Praxair, Inc.
Industrial Avenue
P. O. Box 237
Keasbey, NJ 08832
Tel (908) 738-4000
Fax (908) 738-9586

March 5, 1997

VIA OVERNIGHT MAIL

Mr. Pat Evangelista
Emergency and Remedial Response Division
U.S. Environmental Protection Agency
290 Broadway, 19th Floor
New York, NY 10007-1866

Re: Diamond Alkali Superfund Site,
Passaic River Study Area

Dear Mr. Evangelista:

This letter responds to Mr. Caspe's December 24, 1996 section 104(e) letter request to Mr. Lichtenberger, CEO, Praxair, Inc. Praxair was provided an extension of time to answer and needed additional time since the identified facility was sold in 1995.

Praxair has provided below responses to the questions in Attachment A of Mr. Caspe's letter. Please be advised that Praxair's response herein is subject to the availability of records for the Newark facility, which is no longer owned by Praxair, and the recollection of some former employees at the Newark facility. The Newark facility transferred bulk quantities of gases, for example, oxygen, nitrogen, argon, helium, carbon dioxide, nitrous oxide, into cylinders. It also produced acetylene and lime, a co-product of acetylene production.

1. Union Carbide Corporation, its corporate predecessors, or Praxair, Inc., operated at the facility at 360 Avenue P, Newark, NJ (Newark facility) from 1919 to 1995. (In June 1992 Praxair, Inc., formerly Union Carbide Industrial Gases, Inc. (UCIG), a wholly owned subsidiary of Union Carbide Corporation (UCC), was spun off to shareholders of UCC as a separate, stand-alone corporation. Praxair owned the Newark facility and sold it in 1995.)

2. a) No. The Newark facility never had a permit issued pursuant to the Resource Conservation and Recovery Act.

   b) Yes. From 1980 to 1985 the Newark facility was issued permit No. NJ 0029211 which authorized the discharge of noncontact cooling water into Plum Creek. The Newark facility began recycling its discharge in 1986.

3. See Attachment #3.

4. a) Acetylene was manufactured at the Newark facility. The acetylene manufacturing process is briefly described below.

Acetylene was manufactured from the reaction of calcium carbide with water. This produces acetylene gas. Acetylene was made in a generator in which the calcium carbide was fed into water at a controlled rate. Higher purity acetylene was also made by filtering the gas through a medium consisting primarily of diatomaceous earth.

Acetylene was the only product, co-product or by-product that was a hazardous substance.

4. b.i) When calcium carbide mixed with water, acetylene was generated. Acetylene was pumped into cylinders for sale to customers.

4. b.ii) The finished product was acetylene. No other hazardous substances were generated.

4. b.iii) No.

5. See below.

5. a) John Crane, Operations Manager, oversaw the Newark facility operations.
W.A. Moran, Office Administrator, was responsible for managing corrosive material.
Alan Duva, Office Administrator, was responsible for cylinders.
Ralph Day, was responsible for managing 1,1,1 trichloroethane.
Antonio Cruz, Security Officer, was responsible for managing waste alkaline and flammable liquids.

5. b) Available records and conversations with former employees at the Newark facility reveal the following.

Haulers	**Disposal Site**
Cecos International	Cecos International 4879 Spring Grove Avenue Cincinnati, OH 45230
Safety-Kleen Corp.	Safety-Kleen Corp. 1200 Sylvan Street Linden, NJ 07036

Haulers	Disposal Site
Chemical Waste Management, Inc.	Chemical Waste Management of New Jersey Inc. 200 Lister Avenue Newark, NJ 07105
Horwith Trucking Inc. Chemical Waste Management Inc.	Chemical Waste Management Inc. Emelle Facility Alabama Highway 17 @ milemarker 163 Emelle, AL 35459

5. c) We are unable to ascertain all storage practices or all hazardous substances since the time operations commenced at the Newark facility. Available records reveal the following.

Storage Location	Material Stored	Material Storage Container
Outdoor Concrete Platform	Methyl bromide	Steel cylinder (cyl.)
Outdoor Concrete Platform	Methyl mercaptan	Steel cyl.
Outdoor Concrete Platform	Phosgene	Steel cyl.
Outdoor Concrete Platform	Trimethylamine	Steel cyl.
Outdoor Concrete Platform	Propylene oxide	Steel cyl.
	Calcium carbide	Aluminum bin
	Ammonium hydroxide	Glass bottle
	Potassium hydroxide	Glass bottle
	Residual acetone/acetylene	Steel cyl.
	Waste Filter Medium	55 gal. steel drum
	Propylene oxide	Steel drum

5. d) Waste was not treated on-site during the time of operations.

6. a) No process waste waters were generated at the Newark facility.

6. b.i) Floor drains did not connect to a sanitary sewer.

6. b.ii) There was no discharge from the drains.

6. c.i) Yes. Lime pond existed from 1919-1988.

6. c.ii) Un-lined.

6. c.iii) Calcium hydroxide, also known as lime.

6. c.iv) There was no discharge. Lime was sold through Chemline.

6. d.) The attached 1966 diagram identifies an on-site septic tank south of building #1.

7. a.) This information represents a typical annual usage at the Newark facility in the early 1980s. The amounts below reflect USAGE NOT GENERATION. These hazardous substances were raw materials or products except the waste filter medium which was sent as a waste off-site to a t,s,d, facility.

Material	**Typical Annual Usage in Pounds**
Propylene oxide	11 - 100
Calcium Carbide	250,001 - 500,000
Ammonium hydroxide	11 - 100
Potassium hydroxide	11 - 100
Waste filter medium	101 - 1,000
Chlorine	101 - 1,000
Dimethylamine	101 - 1,000
Hydrogen chloride	101 - 1,000
Hydrogen sulfide	11 - 100
Methyl bromide	101 - 1,000
Methyl mercaptan	101 - 1,000
Phosgene	11 - 100
Trimethylamine	101 - 1,000

7. b) No.

8. a) None.

8. b) None

9. a) Yes.

9. a.i) No.

9. a.ii) No.

9. b) We have no data concerning the past dates and duration. However, the flooding, when it occurred, was of Plum Creek, and probably caused by tidal overflows.

10. None.

11. See Attachment 11 for relevant documents. Documents that may have been material to this request were either discarded over the years or are no longer available because we no longer own the Newark facility. We are not able to identify documents no longer available and will not speculate as to their identity or the information contained in them.

12. a) Yes.

12. b) Attachment 12 contains a report prepared by consultants hired to address New Jersey's ECRA upon the transfer of the Newark facility from Union Carbide to Praxair, Inc.

13. a)

6/24/19	-	6.91 acres acquired from Atlanta Smeltoring & Refining
12/22/47	-	7.583 acres acquired from General Foods
4/14/52	-	.0115 acres acquired from Consolidated Products Co.
2/4/66	-	3.10 acres acquired from Celanese Corp.

Pieces of property sold off throughout the years to various parties. Remainder sold 12/27/95 to Newark Recycling & Composting Co., Inc.

13. b) Company owned.

13. c) Union Carbide and Carbon Corporation and its successor, Union Carbide Corporation.

13. d) Prest-O-Lite Company incorporated in 1913 for the purpose of manufacturing, selling, and dealing in acetylene and other gases.

Union Carbide Company, National Carbon, Prest-O-Lite, and Linde Air Products merged into Union Carbide and Carbon Corporation in 1917. Real estate at the Newark facility was purchased and a plant constructed in 1919 by Prest-O-Lite Company, a unit of Union Carbide and Carbon Corporation.

Prest-O-Lite was dissolved in 1951 and its assets were merged with the Linde Air Products Division.

14. a) Praxair, Inc.

14. b) H. W. Lichtenberger, Chairman of the Board
Praxair, Inc.
39 Old Ridgebury Road
Danbury, CT 06810-5113

14. c) Delaware -- Prentice-Hall Corporation System, Inc. (for both Delaware & New Jersey)

14. d) See attached.

14. e) Praxair, Inc. has no parent but has many subsidiaries and affiliates. The corporate structure of Praxair is not relevant to EPA's inquiry and this request for identification of "related companies" is overbroad, unduly burdensome, and not authorized under section 104(e). The Linde Division of Union Carbide Corporation (UCC) existed for decades. In 1989 UCC formed a wholly owned subsidiary, Union Carbide Industrial Gases, Inc. (UCIG), a division of which was Linde. UCIG changed its name to Praxair, Inc. in June 1992. On July 1, 1992 Praxair, Inc. was spun off to shareholders of UCC and became a stand alone, entirely separate corporation from UCC. UCC and Praxair, Inc. are unaffiliated with each other.

There is and was no relationship between Linde Air Products and UCIG or Praxair, Inc., although Linde Air Products Division was a former part of UCC.

14. f) See a) above.

14. g) We are unaware of the history of acquisitions by Union Carbide Corporation and, with respect to Praxair, Inc., maintain that this question is overly broad, burdensome, and not authorized by section 104(e).

14. h)

Date of Incorporation	**State**	**Agents of Service**
10/26/88 Union Carbide Industrial Gases, Inc.	Delaware	CT
6/5/92 Praxair, Inc.	Delaware	Prentice-Hall

14. i) See responses above.

15. Nick DiFranco, Manager, Environmental Affairs, Praxair, Inc., Industrial Highway, P.O. Box 237, Keasbey, NJ 08832.

John Crane, Operations Manager, Praxair, Inc., Industrial Highway, P.O. Box 237, Keasbey, NJ 08832.

Ed Debor, Vermont Records Center, Union Carbide Corporation, LaPorte Road, P.O. Box 489, Morrisville, VT 05661-0489.

Louise DuPlessis, Paralegal, Praxair, Inc., 39 Old Ridgebury Road, Danbury, CT 06810-5113.

Richard G. Tisch, Senior Group Counsel, Praxair, Inc., 39 Old Ridgebury Road, Danbury, CT 06810-5113.

In accordance with the Freedom of Information Act and enabling regulations, please provide the undersigned all documents in the possession of the United States Environmental Protection Agency (EPA) which relate to the EPA's conclusion stated on p.1 of Attachment A Request for Information to the December 24, 1996 letter from EPA to Mr. Lichtenberger that "EPA has information indicating that hazardous substances from the former Union Carbide - Linde Gas Division facility located at 360 Avenue P in Newark, New Jersey may have been discharged into the Passaic River."

Praxair, Inc. agrees to provide the cost for sending and copying such documents should such cost be authorized under 40 CFR Part 2 and not waived.

Very truly yours,

Nicholas A. DiFranco
Manager, Environmental Affairs

cc: Richard G. Tisch, Esq. (w/encls)

Freedom of Information Officer
U.S. Environmental Protection Agency
290 Broadway
New York, NY 10007 - 1866

ATTACHMENT 3

	Yes	No
2,3,7,8 tetrachlorodibenzo-p-dioxin or other dioxin compounds		X
Acetone	X	
Acetylene	X	
Ammonia	X	
Ammonium hydroxide	X	
Benzene		X
Calcium carbide	X	
Chlorine	X	
Dimethyl amine	X	
Ethyl benzene		X
Ethylene oxide	X	
Ferric chloride	X	
Hydrogen chloride	X	
Hydrogen sulfide	X	
Methanol	X	
Methyl bromide	X	
Methyl chloride	X	
Methyl mercaptan	X	
Monomethyl amine		X
Nitric oxide		X
Phosgene	X	
Phosphine		X
Polyaromatic Hydrocarbons		X
If "Yes", please list specific compounds		X
Potassium hydroxide	X	
Propylene oxide	X	
Toluene	X	
1,1,1-trichloroethane	X	
Trimethylamine	X	
Xylene	X	

	Yes	No
PCBs		X
Arsenic		X
Cadmium		X
Chromium		X
Copper		X
Lead		X
Mercury		X
Nickel		X
Silver		X
Zinc		X
Cyanide		X

ATTACHMENT 11

HAZARDOUS WASTE MANIFEST

(As Required By The Alabama Department of Environmental Management)

Please print or type. *(Form designed for use on elite (12-pitch) typewriter.)*

Form Approved. OMB No. 2050-0039. Expires 9-3

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. / Manifest Document No.: NJD 0 8 0 6 2 1 8 8 1 0 0 0 0

2. Page 1 of 1

Information in the shaded area is not required by Federal law.

GENERATOR

3. Generator's Name and Mailing Address
Linde Gases of the MidAtlantic
360 Avenue P , Newark, NJ 07105

4. Generator's Phone (609) 778-6338

A. State Manifest Document Number: CWMA 604274

B. State Generator's ID: SAME

5. Transporter 1 Company Name: CHEMICAL WASTE MANAGEMENT, INC.

6. US EPA ID Number: I L D 0 9 9 2 0 2 6 8 1

C. State Transporter's ID: 810331

D. Transporter's Phone: (201) 465-212

7. Transporter 2 Company Name

8. US EPA ID Number

E. State Transporter's ID

F. Transporter's Phone

9. Designated Facility Name and Site Address
CHEMICAL WASTE MANAGEMENT, INC.
Emelle Facility
Alabama Highway 17 at Mile Marker 163
Emelle, Alabama 35459

10. US EPA ID Number: A L D 0 0 0 6 2 2 4 6 4

G. State Facility's ID

H. Facility's Phone: 205/652-9721

11. US DOT Description *(Including Proper Shipping Name, Hazard Class, and ID Number)*	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vo	I. Waste No.
a. Non-RCRA Regulated Scrpp Acetylene Cylinders Hazard Class N/A UN/N/A CWM Profile Number H44741	001	DT	38000	P	N/A
b. CWM Profile Number					
c. CWM Profile Number					
d. CWM Profile Number					

J. Additional Descriptions for Materials Listed Above
I certify that no absorbent has been added to the waste described on line 11a which would prohibit its being landfill per 3004 (c)
"ORIGINATED IN NEW JERSEY" LIC PLATE# T29214

K. Handling Codes for Wastes Listed Above
a. c. b. d.

15. Special Handling Instructions and Additional Information
Be advised that material may possibly release flammable gases and that transport should be directly to disposal site.

Work Order #: 910207026 Purchase Order #: 0829-841946-000C

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.

If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

Printed/Typed Name | Signature | Month Day Year

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name: FRANK T BRUCE | Signature | Month Day Year

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name | Signature | Month Day Year

DISPOSAL

19. Discrepancy Indication Space

849530010

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.

Printed/Typed Name | Signature | Month Day Year

EPA Form 8700-22 (Rev. 9-86) Previous edition is obsolete.

GENERATOR NO. 1

FRANK P/U 3001 849530011

Chemical Waste Management, Inc.
41-85 Doremus Avenue
Newark, New Jersey 07105
Telephone: (201) 465-2121

INVOICE No C 4205
P. C. No.

CUSTOMER CODE:

SOLD TO · CWM
· EMELLE, AL

PICK UP AT · UCC/LINDE GAS
· NEWARK, NJ

INVOICE DATE	YOUR ORDER NO.	DATE ORDERED	PICK-UP DATE	SHIPPED VIA	TYPE TRUCK
			2/5/91	CWM	DUMP

VOLUME	TYPE WASTE
1 DUMP	H44741 EMPTY ACETYLENE CYLINDERS WO # 91020726

WASTE DESTINATION	Standard Safety Procedures	
EMELLE		

TERMS - NET 10 DAYS

TO BE FILLED IN BY DRIVER

WASTE VOLUME & CODE NO. ACTUALLY PICKED UP

CONTAINERS ✓ ONE

NO.	WASTE CODE NO.	SIZE	CANS – PAILS	CARBOYS	BOXES	DRUMS

BULK

WASTE CODE NO.	GALLONS, POUNDS OR YARDS

RANDY O'NEIL 609-778-6338
CUST. REPRESENTATIVE TEL. NO.

Driver FRANK Trk. No. 1748 Trl. No. 3001

Left Terminal _____

In @ Cust. X 12:30 PM Out of Cust. X 2:30 PM

Breakdown Start _____ Finish _____

In @ Destin. _____ Out of Destin. _____

Date 2-05-91 X _____
CUSTOMER SIGNATURE

DRIVER IS NOT TO ACCEPT LOAD WITHOUT PROPER SIGNED BILL OF LADING.
DRIVER IS NOT TO ACCEPT IMPROPERLY LABELED DRUMS OR DRUMS THAT ARE IN POOR CONDITION

849530012

HAZARDOUS WASTE MANIFEST

(As Required By The Alabama Department of Environmental Management)

Please print or type. *(Form designed for use on elite (12-pitch) typewriter.)*

Form Approved. OMB No. 2050-0039. Expires 9-30-91

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.: NJD060621581 — Manifest Document No.: 00071
2. Page 1 of 1

Information in the shaded areas is not required by Federal law.

3. Generator's Name and Mailing Address: LINDE GASES OF THE MID ATLANTIC, 360 AVENUE P, NEWARK, NEW JERSEY 07105
4. Generator's Phone ( )
5. Transporter 1 Company Name: CHEMICAL WASTE MANAGEMENT INC
6. US EPA ID Number: ILD099202681
7. Transporter 2 Company Name:
8. US EPA ID Number:
9. Designated Facility Name and Site Address: CHEMICAL WASTE MANAGEMENT, INC., Emelle Facility, Alabama Highway 17 at Mile Marker 163, Emelle, Alabama 35459
10. US EPA ID Number: ALD000622464

A. State Manifest Document Number: CWMA 538157
B. State Generator's ID:
C. State Transporter's ID: S-10331
D. Transporter's Phone: 201-465-2121
E. State Transporter's ID:
F. Transporter's Phone:
G. State Facility's ID:
H. Facility's Phone: 205/652-9721

11. US DOT Description *(Including Proper Shipping Name, Hazard Class, and ID Number)*	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol	I. Waste No.
a. NON RCRA REGULATED SCRAP ACETYLENE CYLINDERS HAZARD CLASS: N/A — CWM Profile Number OAKH26781	001	DT	33640	P	N/A
b. CWM Profile Number					
c. CWM Profile Number					
d. CWM Profile Number					

J. Additional Descriptions for Materials Listed Above

"I CERTIFY THAT NO ABSORBENT GAS BEEN ADDED TO THE WASTE DESCRIBED ON LINE 11A WHICH WOULD PROHIBIT ITS BEING LANDFILL PER RCRA 3044 (c)". ORIGINATED IN NEW JERSEY ADEM # 030690-0018

K. Handling Codes for Wastes Listed Above: a. c. b. d.

15. Special Handling Instructions and Additional Information

BE ADVISED THAT THE MATERIAL MAY POSSIBLY RELEASE FLAMMABLE GASES AND THAT TRANSPORT SHOULD BE DIRECTLY TO THE DISPOSAL SITE.

Work Order #: 900726010 Purchase Order #: 0629-841946-0011

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.

If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

Printed/Typed Name: LAMONT G. JONES — Signature: Lamont G Jones — Month Day Year: 07 24 90

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name: [illegible] — Signature: [illegible] — Month Day Year: [illegible]

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name — Signature — Month Day Year

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.

Printed/Typed Name — Signature — Month Day Year

EPA Form 8700-22 (Rev. 9-86) Previous edition is obsolete.

Generator No. 1

VHW-001 (REV. 9-84)

849530013

State of New Jersey
Department of Environmental Protection
Division of Waste Management
CN 028, Trenton, NJ 08625

Please print or type. (Form designed for use on elite (12-pitch) typewriter.)

Form Approved. OMB No. 2050-0039. Expires 9-30-88

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. [illegible] Manifest Document No. [illegible]
2. Page 1 of
Information in the shaded areas is not required by Federal law *

3. Generator's Name and Mailing Address
Union Carbide Corporation Linde Division
360 Avenue P
Newark, N.J. 07105

4. Generator's Phone (201) 589-7435

A. State Manifest Document Number **NJA**0266246

B. State Gen. ID

5. Transporter 1 Company Name: Cecos International
6. US EPA ID Number: N Y D 0 8 0 3 3 6 2 4 1

C. State Transporter 1 ID

7. Transporter 2 Company Name: CECOS INTERNATIONAL
8. US EPA ID Number: [illegible]

D. Transporter's Phone

E. State Transporter 2 ID

F. Transporter's Phone

9. Designated Facility Name and Site Address
Cecos International
4879 Spring Grove Avenue
Cincinnati, Ohio 45232

10. US EPA ID Number: [illegible]

G. State Facility's ID

H. Facility's Phone

11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol	I. Waste No.
a. RQ CORROSIVE SOLID NOS CORROSIVE MATERIAL UN 1759	0 1	D M	[illegible]	[illegible]	
b.					
c.					
d.					

JRC	WCA	SWH	WAM
JAB	LGJ		FILE

RECEIVED
NOV 18 1987
UNION CARBIDE CORP.
NEWARK, NEW JERSEY
PLANT #883

J. Additional Descriptions for Materials Listed Above

K. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information

Work Order # 29242 Product Code 11609 A A B

16. **GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.**

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Printed/Typed Name: W. A. MORAN Signature: W. A. Moran Month Day Year: [illegible]

17. Transporter 1 Acknowledgement of Receipt of Materials
Printed/Typed Name: TONY RENO Signature: Tony Reno Date: 11/19/87

18. Transporter 2 Acknowledgement of Receipt of Materials
Printed/Typed Name: TONY RENO Signature: Tony Reno Date: [illegible]

19. Discrepancy Indication Space: 11/a add D002 I/a add D002, D009 per [illegible]

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.
Printed/Typed Name: David E. Blair Signature: David E Blair Date: [illegible]

In case of emergency or spill immediately call the state the emergency occurred in and the N.J. Dept. of Environmental Protection. (609) 292-5560 (Day) (609) 292-7172 (Night)

NJA 0266246

3 - TSD MAIL TO - GENERATOR

VHW-001 (REV. 9/86)

849530014

State of New Jersey
Department of Environmental Protection
Division of Hazardous Waste Management
Manifest Section
CN 028, Trenton, NJ 08625

Please type or print in block letters. (Form designed for use on elite (12-pitch) typewriter.)

Form Approved. OMB No. 2050-0039. Expires 9-30-91

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.: NJD0[illegible]621881 — Manifest Document No.: [illegible]

2. Page 1 of 1

Information in the shaded areas is not required by Federal law.

3. Generator's Name and Mailing Address:
LINDE GASES- MID ATLANTIC
UNION CARBIDE
360 AVENUE P, NEWARK, NJ 07105

4. Generator's Phone (201) 589-7435

A. State Manifest Document Number: **NJA** 0785381

B. State Generator's ID: SAME

5. Transporter 1 Company Name: CHEMICAL WASTE MANAGEMENT, INC.
6. US EPA ID Number: NJD09920[illegible]

C. State Trans. ID: S10331

D. Transporter's Phone (201) 465-4154

7. Transporter 2 Company Name:
8. US EPA ID Number:

E. State Trans. ID:

F. Transporter's Phone ( )

9. Designated Facility Name and Site Address:
CHEMICAL WASTE MANAGEMENT OF NEW JERSEY, INC.
100 LISTER AVE.
NEWARK, NJ 07105

10. US EPA ID Number: NJD089216790

G. State Facility's ID: SAME

H. Facility's Phone (201) 465-9100

11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)	HM	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol	I. Waste No.
a. HAZARDOUS WASTE SOLID, N.O.S. ORME NA9189 RQ D008	X	XX6	DM	X1938	P	D008
b.						
c.						
d.						

J. Additional Descriptions for Materials Listed Above
a. 100% USED MONKEY DUST (S,T) EML
b.
c.
d.

K. Handling Codes for Wastes Listed Above
a. S01
b.
c.
d.

15. Special Handling Instructions and Additional Information

A)D27859

WO#S01460

16. **GENERATOR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.

If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; **OR**, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

Printed/Typed Name: James A Baird — Signature: [signature] — Month Day Year: 05 04 90

17. Transporter 1 Acknowledgement of Receipt of Materials
Printed/Typed Name: [illegible] — Signature: [signature] — Month Day Year: 05 04 90

18. Transporter 2 Acknowledgement of Receipt of Materials
Printed/Typed Name: — Signature: — Month Day Year:

19. Discrepancy Indication Space
I. Added manifest document #.
11a. Added RQ information. All per phone conversation with James Baird on 5/4/90.

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.
Printed/Typed Name: J. Wylie Donald — Signature: [signature] — Month Day Year: 05 04 90

In case of an emergency or spill immediately call the state the emergency occurred in and the N.J. Dept. of Environmental Protection. (609) 292-5560 (Day) (609) 292-7172 (Night)

NJA 0785381

EPA Form 8700-22 (Rev. 9/88) Previous editions are obsolete.

SIGNATURE AND INFORMATION *MUST* BE LEGIBLE ON ALL COPIES

3 — TSD MAIL TO - GENERATOR

HAZARDOUS WASTE MANIFEST

(As Required By The Alabama Department of Environmental Management)

Please print or type. *(Form designed for use on elite (12-pitch) typewriter.)*

Form Approved. OMB No. 2050-0039. Expires 9-30-91

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. N J D 0 8 0 6 2 1 8 8 1 0 0 0 0 C — Manifest Document No.

2. Page 1 of 1

Information in the shaded areas is not required by Federal law.

GENERATOR

3. Generator's Name and Mailing Address
LINDE GASES OF THE MIDLANTIC
360 AVE. P NEWARK, N.J. 07105

4. Generator's Phone (609) 778-6338

A. State Manifest Document Number: CWMA 604275

B. State Generator's ID: SAME

5. Transporter 1 Company Name: HORWITH TRUCKINGIINC.

6. US EPA ID Number: P A D 0 6 4 0 3 5 8 1 9

C. State Transporter's ID: S7110

D. Transporter's Phone: 215-261-2220

7. Transporter 2 Company Name:

8. US EPA ID Number:

E. State Transporter's ID:

F. Transporter's Phone:

9. Designated Facility Name and Site Address
CHEMICAL WASTE MANAGEMENT, INC.
Emelle Facility
Alabama Highway 17 at Mile Marker 163
Emelle, Alabama 35459

10. US EPA ID Number: A L D 0 0 0 6 2 2 4 6 4

G. State Facility's ID:

H. Facility's Phone: 205/652-9721

11. US DOT Description *(Including Proper Shipping Name, Hazard Class, and ID Number)*	12. Containers No.	12. Containers Type	13. Total Quantity	14. Unit Wt/Vol	I. Waste No.
a. CWM 052291-2001 ADEM NON-RCRA REGULATED SCRAP ACETYLENE CYLINDERS HAZARD CLASS N/A UN-N/A CWM Profile Number H44741	0 0 1	D T	3 3 1 6 0	P	N/A
b. CWM Profile Number					
c. CWM Profile Number					
d. CWM Profile Number					

J. Additional Descriptions for Materials Listed Above
I certify that no absorbent has been added to the waste described on line 11a which would prohibit its being landfill per 3004 (c)
"ORIGINATED IN NEW JERSEY"

K. Handling Codes for Wastes Listed Above
a. L b. c. d.

15. Special Handling Instructions and Additional Information
Be advised that material may possibly release flammable gases and that transport should be directly to disposal site.

Work Order #: 910208036 Purchase Order #: 0829-841946-000C

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.

If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

Printed/Typed Name	Signature	Month Day Year
J JOHN CRANE	John Crane	10 20 6 9 1

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month Day Year
GORDON BIRD	Gordon Bird	10 20 6 9 1

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month Day Year

FACILITY

19. Discrepancy Indication Space
849530015

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.

Printed/Typed Name	Signature	Month Day Year
Tim CAldoll		10 20 86

EPA Form 8700-22 (Rev. 9-86) Previous edition is obsolete. GENERATOR No. 2 (Must Accompany Shipment)

HAZARDOUS WASTE MANIFEST

(As Required By The Alabama Department of Environmental Management)

(10)

Please print or type. (Form designed for use on elite (12-pitch) typewriter.) 331748 / 352061 Form Approved. OMB No. 2050-0039. Expires 9-30-91

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. N J D 0 8 0 6 2 1 8 8 1 | Manifest Document No. 0 0 0 C

2. Page 1 of 1

Information in the shaded areas is not required by Federal law.

3. Generator's Name and Mailing Address
Linde Gases of the MidAtlantic
360 Avenue P , Newark, NJ 07105

4. Generator's Phone (609) 778-6338

A. State Manifest Document Number: CWMA 604274

B. State Generator's ID: SAME

5. Transporter 1 Company Name: CHEMICAL WASTE MANAGEMENT, INC.

6. US EPA ID Number: I L D 0 9 9 2 0 2 6 8 1

C. State Transporter's ID: S10331

D. Transporter's Phone: (201) 465-2121

7. Transporter 2 Company Name:

8. US EPA ID Number:

E. State Transporter's ID:

F. Transporter's Phone:

9. Designated Facility Name and Site Address
CHEMICAL WASTE MANAGEMENT, INC.
Emelle Facility
Alabama Highway 17 at Mile Marker 163
Emelle, Alabama 35459

10. US EPA ID Number: A L D 0 0 0 6 2 2 4 6 4

G. State Facility's ID:

H. Facility's Phone: 205/652-9721

11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol	I. Waste No.
a. CWM 052291-2001 ADEM Non-RCRA Regulated Scrap Acetylene Cylinders Hazard Class N/A UN/N/A CWM Profile Number H44741	0 0 1	D T	3 8 0 0 0	P	N/A
b. CWM Profile Number					
c. CWM Profile Number					
d. CWM Profile Number					

J. Additional Descriptions for Materials Listed Above
I certify that no absorbent has been added to the waste described on line 11a which would prohibit its being landfill per 3004 (c)
"ORIGINATED IN NEW JERSEY" Lic. PLATE # T382LW

K. Handling Codes for Wastes Listed Above
a. L c.
b. d.

15. Special Handling Instructions and Additional Information
Be advised that material may possibly release flammable gases, and that transport should be directly to disposal site. In an event of an emergency Contact Chemical Waste Management, Inc. at (205) 652-9721

Work Order #: 910207026 Purchase Order #: 0829-841946-000C

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.

If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

GENERATOR

Printed/Typed Name	Signature	Month Day Year
JOHN R CRANE	John Crane	10 21 5 91

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month Day Year
FRANK T. BARONE	Frank T. Barone	10 21 5 91

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month Day Year

FACILITY

19. Discrepancy Indication Space
Emergency # added per IC 2/7/91

849530016

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.

Printed/Typed Name	Signature	Month Day Year
Vanessa Giles	Vanessa Giles	10 29 91

EPA Form 8700-22 (Rev. 9-86) Previous edition is obsolete. GENERATOR No. 2 (Must Accompany Shipment)

849530017

State of New Jersey
Department of Environmental Protection
Division of Hazardous Waste Management
Manifest Section
CN 028, Trenton, NJ 08625

...nt in block letters. (Form designed for use on elite (12-pitch) typewriter.)

Form Approved. OMB No. 2050-0039. Expires 9-30-91

...NIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.: WJD080621881 — Manifest Document No.: 00001

2. Page 1 of 1

Information in the shaded areas is not required by Federal law.

Generator's Name and Mailing Address:
LINDE GASES OF THE MID-ATLANTIC, INC.
360 AVENUE P NEWARK, NJ 07105

4. Generator's Phone (609) 778-6338

A. State Manifest Document Number: **NJA** 0949830

B. State Generator's ID: SAME

5. Transporter 1 Company Name: CHEMICAL WASTE MANAGEMENT, INC.

6. US EPA ID Number: ILD000672681 / 0293032

C. State Trans. ID: S110331

D. Transporter's Phone (201) 465-4154

7. Transporter 2 Company Name:

8. US EPA ID Number:

E. State Trans. ID:

F. Transporter's Phone ( )

9. Designated Facility Name and Site Address:
CHEMICAL WASTE MANAGEMENT OF NEW JERSEY, INC.
100 LISTER AVE.
NEWARK, NJ 07105

10. US EPA ID Number: NJD089216790

G. State Facility's ID

H. Facility's Phone (201) 465-9100

	HM	11. US DOT Description *(Including Proper Shipping Name, Hazard Class, and ID Number)*	12. Containers No.	12. Containers Type	13. Total Quantity	14. Unit Wt/Vol	I. Waste No.
a.	X	WASTE ALKALINE LIQUID, N.O.S. CORROSIVE MATERIAL NA1719 "GUIDE 60"	X30	DF	XX172	G	D002
b.	X	WASTE FLAMMABLE LIQUID, N.O.S. (F005, D001) FLAMMABLE LIQUID UN1993 "GUIDE 27"	XX5	DF	XXX80	G	F003
c.	X	WASTE ACID LIQUID, N.O.S. CORROSIVE MATERIAL NA1760 "GUIDE 60"	X32	DF	XX160	G	D002
d.	X	WASTE FLAMMABLE LIQUID, N.O.S. (D001) FLAMMABLE LIQUID UN1993 "GUIDE 27"	XX2	DM	XX110	G	F003

J. Additional Descriptions for Materials Listed Above

a. W06010 (AMMONIUM HYDROXIDE, POTASSIUM HYDROXIDE) (C,L) LG-1-21,28,54,55,57-62

c. W06010 (HYDROCHLORIC ACID, SULFURIC ACID) (C,L) LG-22-27,31-51,56,63-66

b. W06010 (XYLENE, ACETONE, TOLUENE) (I,L) LG-30,67-70 (F005,D001)

d. U02000 (XYLENE) (I,L) CT 1,2 (D001)

K. Handling Codes for Wastes Listed Above
a. c. b. d.

15. Special Handling Instructions and Additional Information
a-c) PACKAGED LAB CHEMICALS; SEE LISTS
WO# 502054 ; JOB 6521
BILL TECH SERVICES MID ATLANTIC DIVISION ACCT # 174-91
IN CASE OF EMERGENCY CONTACT CHEMTREC AT 1-800-424-9300

16. **GENERATOR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.

If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

Printed/Typed Name	Signature	Month Day Year
ANTONIO CRUZ (SECURITY OFFICER)	Antonio Cruz	01 15 91

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month Day Year
CAROLYN THIERFELDER	Carolyn Thierfelder	01 15 91

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month Day Year

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.

Printed/Typed Name	Signature	Month Day Year

NJA 0949830

Form 8700-22 (Rev. 9/88) Previous editions are obsolete.

SIGNATURE AND INFORMATION *MUST* BE LEGIBLE ON ALL COPIES

TSD MAIL TO - TSD'S STATE

State of New Jersey
Department of Environmental Protection
Division of Hazardous Waste Management
Manifest Section
CN 028, Trenton, NJ 08625

Please type or print in block letters. (Form designed for use on elite (12-pitch) typewriter.)

Form Approved. OMB No. 2050-0039. Expires 9-30-

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. NJD082621881 Manifest Document No. 05012

2. Page 1 of 1

Information in the shaded areas is not required by Federal law.

3. Generator's Name and Mailing Address
LINDE GASES OF THE MID-ATLANTIC, INC.
360 AVENUE P NEWARK NJ 07105

A. State Manifest Document Number NJA 0949831

4. Generator's Phone (609) 778-6338

B. State Generator's ID SAME

5. Transporter 1 Company Name CHEMICAL WASTE MANAGEMENT, INC.

6. US EPA ID Number ILD092026811

C. State Trans. ID 510331

7. Transporter 2 Company Name

8. US EPA ID Number

D. Transporter's Phone (201) 465-415

E. State Trans. ID

9. Designated Facility Name and Site Address
CHEMICAL WASTE MANAGEMENT OF NEW JERSEY, INC.
100 LISTER AVE.
NEWARK NJ 07105

10. US EPA ID Number NJD089216790

F. Transporter's Phone ( )

G. State Facility's ID

H. Facility's Phone (201) 465-9100

	11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number) HM		12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol	I. Waste No.
a.	X	WASTE FLAMMABLE LIQUID, N.O.S. (F005, D001) FLAMMABLE LIQUID UN1993 "GUIDE 27"	X15	DM	XXX75	G	F003
b.	X	WASTE FLAMMABLE LIQUID, N.O.S. (F005, D001) FLAMMABLE LIQUID UN1993 "GUIDE 27"	XX3	DF	XXX15	G	F003
c.		NON REGULATED MATERIAL NON REGULATED	X13	DF	XXX65	G	X900
d.		NON REGULATED MATERIAL NON REGULATED	XX6	DF	XXX96	G	X900

J. Additional Descriptions for Materials Listed Above

a. (I,L) UC1-6,8,11-16,26 (F005, D001) WO6025 (XYLENE, TOLUENE)

c. (L) UCR-24,25,27-31 WO6025

b. (I,L) UC7,10,17 (F005, D001) WO6025 (XYLENE, TOLUENE)

d. (L) LG29,52,53,71,72,73 WG6010

K. Handling Codes for Wastes Listed Above

a. S01 c. S01

b. S01 d. S01

15. Special Handling Instructions and Additional Information
a-d) PACKAGED LAB CHEMICALS; SEE LISTS
WO# 302054 LOG 652H
BILL TECH SERVICES MID-ATLANTIC DIVISON ACCT # 174-91
IN CASE OF EMERGENCY CONTACT CHEMTREC AT 1-800-424-9300

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.

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GENERATOR

Printed/Typed Name	Signature	Month	Day	Year
ANTONIO CRUZ Safety Officer	Antonio Cruz	01	15	91

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Year
CAROLYN THIERFELDER	Carolyn Thierfelder	01	15	91

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Year

FACILITY

19. Discrepancy Indication Space

849530018

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.

Printed/Typed Name	Signature	Month	Day	Year
Daniel Knutson		01	16	91

EPA Form 8700-22 (Rev. 9/88) Previous editions are obsolete.

SIGNATURE AND INFORMATION *MUST* BE LEGIBLE ON ALL COPIES

3 — TSD MAIL TO - GENERATOR

In case of emergency call the state the emergency occurred in and the N.J. Dept. of Environmental Protection, (609) 292-5563 (Day) (609) 292-7172 (Night)

State of New Jersey
Department of Environmental Protection
Division of Hazardous Waste Management
Manifest Section
CN 028, Trenton, NJ 08625

Please type or print in block letters. (Form designed for use on elite (12-pitch) typewriter.)

Form Approved. OMB No. 2050-0039. Expires 9-30-91

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.: NJD080621881
Manifest Document No.: [illegible]
2. Page 1 of 1
Information in the shaded areas is not required by Federal law.

3. Generator's Name and Mailing Address
UNION CARBIDE
360 AVE P
NEWARK, NJ 07105
4. Generator's Phone ( ) [illegible]

A. State Manifest Document Number: NJA 1144205
B. State Generator's ID: SAME

5. Transporter 1 Company Name: SAFETY-KLEEN CORP.
6. US EPA ID Number: ILD051060408
C. State Trans. ID: [illegible]
D. Transporter's Phone ( ) [illegible]

7. Transporter 2 Company Name:
8. US EPA ID Number:
E. State Trans. ID:
F. Transporter's Phone ( )

9. Designated Facility Name and Site Address
SAFETY-KLEEN CORP.
1200 SYLVAN ST.
LINDEN, NJ 07036
0-006-35
10. US EPA ID Number: NJD002182897
G. State Facility's ID: [illegible]
H. Facility's Phone: 201-862-2000

11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)	HM	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol	I. Waste No.
a. WASTE 1,1,1-TRICHLOROETHANE ORM_A UN2831 (F001)(ERG#74)	X	XX2	DM	XX984	P	F001
b. PETROLEUM OIL COMBUSTIBLE LIQUID NA1270 (ERG#27) (NOT USEPA HAZARDOUS WASTE)(NJ X726)	X	XX1	DM	XX458	P	X726
c.						
d.						

J. Additional Descriptions for Materials Listed Above
a.
b. NHZW
c.
d.

K. Handling Codes for Wastes Listed Above
a. S02
b. S04
c.
d.

15. Special Handling Instructions and Additional Information: 1-118-02-9283, INV.#M65081, WEEK 91-16
11a SAM#135808 CONTROL#0091247-5 11d SAM# CONTROL#
11b SAM#135807 CONTROL#0091244-8 EMERG. RESP. # 1-708-888-4660
11c SAM# CONTROL# SKDOT# A:0511 B:1092 C: D:

16. **GENERATOR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.

If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

368/446

Printed/Typed Name: RALPH DAY | Signature: Ralph Day | Month Day Year: 04 18 91

17. Transporter 1 Acknowledgement of Receipt of Materials
Printed/Typed Name: MARK DeFederico | Signature: [signature] | Month Day Year: 04 18 91

18. Transporter 2 Acknowledgement of Receipt of Materials
Printed/Typed Name: | Signature: | Month Day Year:

19. Discrepancy Indication Space
849530019

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.
Printed/Typed Name: [signature] | Signature: [signature] | Month Day Year: [illegible]

EPA Form 8700-22 (Rev. 9/88) Previous editions are obsolete.

3 — TSD MAIL TO - GENERATOR

SIGNATURE AND INFORMATION *MUST* BE LEGIBLE ON ALL COPIES

If spill or emergency occurred in and the N.J. Dept. of Environmental Protection. (609) 292-5560 (Day) (609) 292-7172 (Night)

NJA

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
HAZARDOUS WASTE GENERATOR ANNUAL REPORT 1987
- REPORT FORM -

1. Generator Name: UCC LINDE DIVISION 2. EPA ID No.: NJD 080336241
3. Site Address: 360 AVENUE P NEWARK NEW JERSEY 07105
4. Transporter Name: CECOS INTERNATIONAL 5. EPA ID No.: NJD 080336241
6. TSD Facility Name: CECOS INTERNATIONAL 7. EPA ID No.: OHD 000816629
8. TSD Address: 4879 SPRING GROVE AVE. CIICINNATI OHIO 45230

9. A.) Waste Number	B.) Waste Description	C.) DOT Haz Class	D.) Total Quantity	E.) Units
Doo9-D002	CORROSIVE SOLID NOS	CORROSIVE MATERIAL UN 1759	880	P

NOTE: For each combination of transporter and TSD facility, list the total quantity manifested for each waste type.

849530020

PAGE ___ OF ___

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
HAZARDOUS WASTE GENERATOR ANNUAL REPORT 1987
- REPORT FORM -

1. Generator Name: UCC LINDE DIVISION 2. EPA ID No.: NJD 080621881
3. Site Address: 360 AVENUE P NEWARK NEW JERSEY 07105
4. Transporter Name: NEWARK DISPOSAL 5. EPA ID No.: 8138
6. TSD Facility Name: H.M.D.C. 7. EPA ID No.: 0907W
8. TSD Address: 1 De Korte PARK PLAZA LYNDHURST N.J. 07071

9. A.) Waste Number	B.) Waste Description	C.) DOT Haz Class	D.) Total Quantity	E.) Units
	ASBESTOS	ORN-C	74.1	Y

NOTE: For each combination of transporter and TSD facility, list the total quantity manifested for each waste type.

849530021

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
HAZARDOUS WASTE GENERATOR ANNUAL REPORT 1987
- WASTE SUMMARY FORM -

Generator Name: UNION CARBIDE CORP. LINDE DIVISION

EPA ID No.: N.J.D. 080621881

DIRECTIONS:

Please indicate below the total quantity of hazardous waste manifested during the 1987 report year for each unit of measure. Enter the units of measure as they appeared on the manifest(s). Do not convert one form of unit of measure to another.

0	G - Gallons (liquids only)
880	P - Pounds
0	T - Tons (2,000 lbs.)
74.1	Y - Cubic Yards
0	L - Liters (liquids only)
0	K - Kilograms
0	M - Metric Tons (1,000 kg)
0	N - Cubic Meters

*Enter zero (0) for units of measure which were not utilized.

849530022

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
HAZARDOUS WASTE GENERATOR ANNUAL REPORT 1984

I. EPA ID Number: NJD 080621881

II. Generator Name: Union Carbide Corporation Linde Division

III. _____ Check here if there was no hazardous waste manifested during the report year.

III B. ✓ Check here if the company is considered a small quantity generator.

IV. Contact Person: John R. Crane

V. Phone Number: 201-598-7435

VI. Annual total of waste generated (Attachment)

VII. Company information verification (Attachment)

VIII. Certification

I certify that the information given in this annual report is true, accurate and complete.

John R. Crane		2-12-85
(Print or type name)	(Signature)	(Date)

849530023

COPY AS SNT 2/25/82

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF HAZARDOUS WASTE
GENERATOR'S ANNUAL REPORT
FOR YEAR OF 1981

1. GENERATOR'S NAME UNION CARBIDE CORP.- LINDE DIVISION 2. EPA ID NO. NJD080621881

3. ADDRESS 360 AVE P NEWARK, N.J. 07105

4. TRANSPORTER'S NAME N/A 5. EPA ID NO. N/A

6. ADDRESS N/A

7. FACILITY'S NAME N/A 8. EPA ID NO. N/A

9. ADDRESS N /A

10. MANIFEST NO.	DESCRIPTION OF WASTE	DOT HAZ.CLASS	QUANTITY	UNITS	EPA WASTE TYPE	REJECTE

* - PLACE AN "*" UNDER THE REJECTED COLUMN FOR THOSE MANIFESTS REJECTED BY FACILITY.

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
HAZARDOUS WASTE GENERATOR ANNUAL REPORT 1987
- REPORT FORM -

1. Generator Name: UCC UNDE DIJISION 2. EPA ID No.: NJD080621881
3. Site Address: 360 AVE P NEWARK, N.J. 07105
4. Transporter Name: Cecos International 5. EPA ID No.: NYD080336241
6. TSD Facility Name: Cecos International 7. EPA ID No.: OHD000816629
8. TSD Address: 4679 Spring Grove Ave, Cincinnati, OHIO 45230

9. A.) Waste Number	B.) Waste Description	C.) DOT Haz Class	D.) Total Quantity	E.) Units
D009-D02	CORROSIVE SOLID NOS	CORROSIVE MATERIAL UN1759 NO LABEL	880	P

E: For each combination of transporter and TSD facility, list the total quantity manifested for each waste type.

849530025

Disposal
CASOTA
644-2555
JO L

MENT OF ENVIRONMENTAL PROTECTION
E GENERATOR ANNUAL REPORT 1987
- REPORT FORM -

DIVISION 2. EPA ID No.: NJD.080621881

3. Site Address: 360 AVE P NEWARK, N.J. 07105

4. Transporter Name: Newark Disposal 5. EPA ID No.: 8138

6. TSD Facility Name: Hackensack HMCD Balan-Bypass 7. ~~EPA~~ DEP ID No.: 0907W

8. TSD Address: 1 Dakonte Park Plaza Lyndhurst 07071

9.	A.) Waste Number	B.) Waste Description	C.) DOT Haz Class	D.) Total Quantity	E.) Units
		WASTE Asbestos	DRN-C NO LABEL NO UN Number	2000	Cu. FT.

HACKENSACK MEADOWLANDS
DEVELOPMENT COMMISSION
460-1700 -
998-7900 - DAN BALAN
DEP # 0907W
EPA #
CHRIS.

NOTE: For each combination of transporter and quantity manifested for each waste type.

849530026

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
HAZARDOUS WASTE GENERATOR ANNUAL REPORT 1987
- WASTE SUMMARY FORM -

Generator Name: UNION CARBIDE CORP LINDE DIVISION

EPA ID No.: NJD. 080621881

DIRECTIONS:

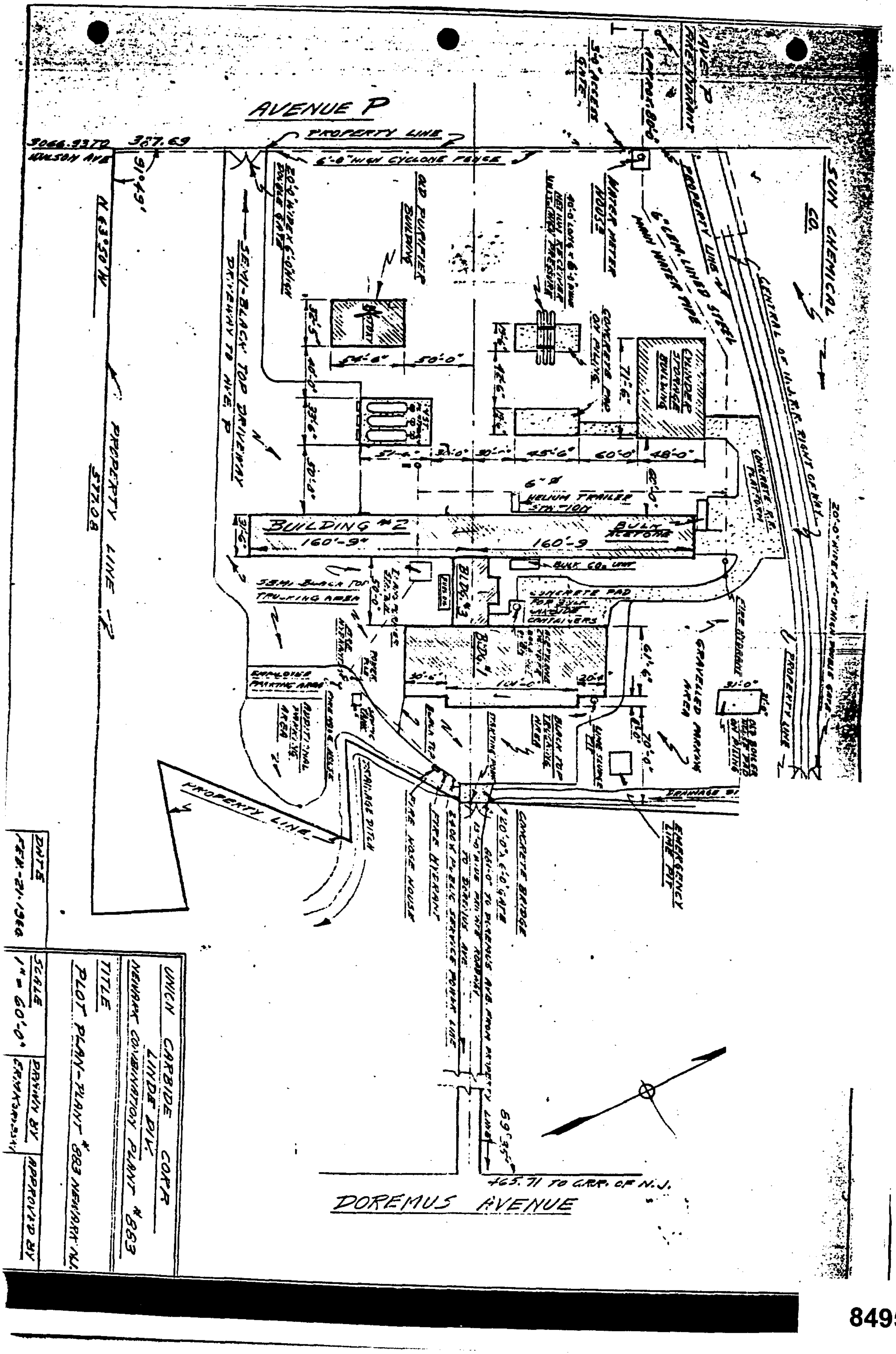
Please indicate below the total quantity of hazardous waste manifested during the 1987 report year for each unit of measure. Enter the units of measure as they appeared on the manifest(s). Do not convert one form of unit of measure to another.

0	G - Gallons (liquids only)
880	P - Pounds
0	T - Tons (2,000 lbs.)
74.1	Y - Cubic Yards
0	L - Liters (liquids only)
0	K - Kilograms
0	M - Metric Tons (1,000 kg)
0	N - Cubic Meters

*Enter zero (0) for units of measure which were not utilized.

849530027

ATTACHMENT 6. d)



849530028

ATTACHMENT 12.

INTERNATIONAL TECHNOLOGY CORPORATION

REMEDIAL INVESTIGATION REPORT
PRAXAIR, INC.
NEWARK, NEW JERSEY
ISRA CASE NO. 90254

RESPONSIVE TO THE NEEDS OF ENVIRONMENTAL MANAGEMENT

REMEDIAL INVESTIGATION REPORT
PRAXAIR, INC.
NEWARK, NEW JERSEY
ISRA CASE NO. 90254

PREPARED FOR:

PRAXAIR, INC.
LINDE DIVISION
P.O. BOX 44
TONAWANDA, NEW YORK 14151-0044

PREPARED BY:

IT CORPORATION
165 FIELDCREST AVENUE
EDISON, NEW JERSEY 08837

PROJECT NO. 529342

SEPTEMBER 1993

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1.0 Introduction

Linde Gases of the Mid-Atlantic, Inc. (Linde) ceased operations of its Newark, New Jersey facility in 1990. Linde formerly was a subsidiary of Union Carbide Industrial Gases, Inc. (UCIG), which in turn was a subsidiary of Union Carbide Corporation. The cessation of operations required Linde to comply with the Environmental Cleanup Responsibility Act (ECRA), as amended and supplemented by the Industrial Site Recovery Act (ISRA), effective July 1, 1993. ISRA is administered by the New Jersey Department of Environmental Protection and Energy (NJDEPE).

A final conditional sampling plan approval letter was received on October 15, 1991 from the NJDEPE. IT Corporation (IT) implemented a soil and groundwater investigation at the Linde Newark, New Jersey facility and submitted a summary report to the NJDEPE in January 1992, on behalf of Linde.

On April 3, 1992, the NJDEPE issued a comment letter in response to the January 1992 report. Subsequent to receipt of the April 3, 1992 letter, a meeting/site walk was held at the Linde Newark, New Jersey facility on May 18, 1992. Attendees of the meeting, representing the NJDEPE, Linde and IT, discussed the various areas of environmental concern of the property, and related issues following a site walk. Subsequent to the May 18, 1992 meeting/site walk, the NJDEPE issued a conditional approval letter dated June 29, 1992. This letter outlined the agreed upon course of action for the respective areas of environmental concern at the property.

In June 1992, Linde's parent company UCIG changed its name to Praxair, Inc. and was spun-off from Union Carbide Corporation.

IT implemented a soil and groundwater investigation in response to the June 29, 1992 NJDEPE approval letter. A Remedial Investigation Report (RIR) was submitted to the NJDEPE in September 1992. The RIR summarized the results of this investigation and concluded with a no further action proposal.

In January 1993, the NJDEPE issued a comment letter to the September 1992 RIR stating certain Praxair proposals for no further action were unacceptable. As a result, a meeting was held between the NJDEPE, Praxair and IT on April 19, 1993. This meeting resulted in a consensus for a future course of action regarding the remaining areas of environmental concern. This consensus was confirmed in Praxair's May 5, 1993 letter to the NJDEPE.

In July 1993, Praxair submitted a RIR summarizing the results of the investigation completed according to the consensus reached and documented in the May 5, 1993 Praxair letter to the NJDEPE.

As requested, the NJDEPE completed an expedited review of the July 1993 RIR to facilitate immediate action by Praxair, if any. Comments from the NJDEPE were received by telephone on August 3, 1993 and documented in Praxair's letter to the NJDEPE dated August 4, 1993. Appendix A contains a copy of the August 4, 1993 Praxair letter to the NJDEPE.

As a result of NJDEPE input, it was established that the only remaining area of environmental concern at this site was the lime pond area. Therefore, Praxair was able to immediately implement further remedial action in this area.

This September 1993 RIR, prepared for Praxair, summarizes the results of the additional remedial action in the lime pond area. These actions were implemented as a result of the NJDEPE verbal comments received on August 3, 1993.

2.0 Lime Pond Area

The lime pond area is in the southern portion of the property. The entire area is estimated to be 4.5 to 5.0 acres, approximately half of the property's estimated 10 acres. Figure 1 shows the facility site plan depicting the lime pond area within the property.

Because of the historic backfilling of the lime pond area with soil from a non-documented/unknown source, Praxair conducted random sampling to initially characterize the area. Five soil samples, LP-1 through LP-5, were collected and analyzed for full priority pollutants plus forty (PP+40) and total petroleum hydrocarbons (TPHC). Sampling of the backfill soil was completed in July 1992.

Results of the soil sample PP+40 and TPHC analyses indicated the fill used in this area is consistent with the surrounding industrial area and the anticipated future non-residential property use. Primarily, there were limited metals and polynuclear aromatic hydrocarbons detected in the fill material samples, indicating there were no exorbitant levels of hazardous substances in the fill. The remaining fractions of the PP+40 analyses were either not detected or exhibited insignificantly low concentrations of contaminants. The TPHC analytical results ranged from 1,000 to 8,200 parts per million (ppm). The results also gave no indication that this area has been utilized as a repository for hazardous substances.

Based upon the meeting discussions with the NJDEPE, it was agreed that additional soil sampling was needed to more fully characterize this large area.

Utilizing EPA methodology outlined in EPA's July 1991 publication *A Guide: Methods for Evaluating the Attainment of Cleanup Standards for Soil and Solid Media,* (EPA Publication 9355.4-04FS), Praxair determined that 50 soil samples would be an appropriate number of samples for this area. To best characterize the area, 25 locations were evenly laid out in a grid formation over the 400 by 500-foot area. Figure 2 shows the 25 soil sampling locations in the lime pond area. Two samples were collected at each location, one at the surficial six-inch interval and the second at the 1.5 to 2.0 foot interval below existing grade. Based upon the analytical results of the initial five investigative samples, the 50 soil samples were analyzed for arsenic, chromium, copper, lead, zinc and the priority pollutant polynuclear aromatic hydrocarbons (PAHs).

Analytical results in the grid soil sampling program indicated elevated levels of lead, arsenic, and benzo(a)pyrene (BaP) in surficial soil in exceedence of NJDEPE soil cleanup guidance. The average lead concentration of all samples was 2,330 ppm with concentrations ranging from 13 ppm to 28,000 ppm. The average concentration of arsenic was 15.3 ppm with concentrations ranging from 0.91 ppm to 60 ppm. The average concentration of BaP was 1.48 ppm with concentrations ranging from not detected to 22 ppm.

On August 3, 1993, Praxair held discussions with the NJDEPE regarding the July 1993 RIR and possible remedial alternatives for this area. These discussions resulted in revised site-specific soil cleanup guidance of 1,200 ppm for lead and less than 20 ppm for arsenic. Additionally, a consensus was reached with the NJDEPE for removal of lime pond area "hot spot" locations by excavation with confirmatory postexcavation soil sample analyses utilizing the revised soil cleanup guidance.

Lead, arsenic and BaP were the only remaining contaminants exhibiting elevated concentrations at several sample points. Remedial excavations were completed at locations with these elevated contaminant concentrations. Figure 2 shows the original soil sampling locations where remedial excavations were completed. The remedial excavations progressed in stages based upon confirmatory postexcavation soil sample analytical results. Initial excavations were completed on August 5, 1993 at previous soil sampling locations LP-8, LP-11, LP-14, LP-17, LP-18, LP-19, LP-21, LP-23, LP-24, LP-25, LP-27 and LP-30. Some locations required removal of additional soil. Therefore, excavations were continued at locations LP-14, LP-17, LP-19, LP-23, LP-24, LP-25, LP-27 and LP-30 on August 14, 1993 and again at locations LP-14, LP-24, and LP-27 on August 24, 1993. Final excavations were completed on September 8, 1993 at location LP-14 only. Appendix B contains copies of the excavation classification logs. Appendix C contains copies of the postexcavation soil sample collection logs.

The cumulative data for postexcavation soil sampling analytical results of all excavations was evaluated following the August 24, 1993 excavations. At this point it was determined that average lead concentrations were 1,164.4 ppm and average arsenic concentrations were 14.3 ppm. These average concentrations are below the NJDEPE revised site-specific soil cleanup guidance of 1,200 ppm for lead and less than 20 ppm for arsenic.

From 41 sample data points, generated as of the August 24, 1993 excavations, the average BaP concentration was reduced to 1.28 ppm. The initial grid sampling analytical results of 50 data points had a 44% rate of not detected for BaP. Furthermore, this area consists of a non-process

related/historical fill. Based upon these factors, Praxair believed a larger data base would confirm the historical fill condition and provide greater confidence in the final average concentration. As a result, postexcavation soil samples were collected for BaP analysis at previously excavated locations. Postexcavation soil samples were initially collected at these excavations for confirmatory analyses of lead and arsenic, but these samples had not been analyzed for BaP.

Results of the additional BaP soil sample analyses indicate the average BaP concentration in the lime pond area is 1.44 ppm. Table 1 attached provides a summary of the latest existing soil sampling analytical data for the lime pond area with average arsenic, lead and BaP concentrations, respectively. Average concentrations are calculated from both the remaining unexcavated grid soil sampling locations of May 1993 and final confirmatory postexcavation soil sample analytical results.

3.0 Conclusions and Recommendations

Historically the lime pond area was utilized for the temporary storage of lime, a co-product of the acetylene gas production at the Newark, New Jersey plant. The lime was removed from this area and sold for various beneficial environmental uses including wastewater treatment. Following the cessation of acetylene gas production operations, this area was back-filled with local fill materials whose source remains unknown at the present time. This back-filling took place during the 1960s. As a result, this fill material was investigated by means of a representative grid soil sampling program. The investigative soil sampling program revealed the presence of minimal contamination consistent with the heavily industrialized surrounding area. However, a limited amount of elevated contamination ("hot spots") was present within the lime pond area and removal of the hot spots was completed by remedial excavation. Approximately 138 cubic yards of contaminated historical fill material was removed by excavation in the lime pond area. Postexcavation soil sample analytical results indicate average contaminant concentrations have been reduced significantly in the lime pond area. Specifically, average concentrations of arsenic, lead and BaP have been reduced from 15.3 ppm, 2,330 ppm and 1.48 ppm to 14.3 ppm, 1,164.4 ppm and 1.44 ppm, respectively.

BaP hot spots of 22 ppm and 13 ppm have been removed. The highest concentration of BaP in the lime pond area has been reduced from 22 ppm to 9.9 ppm. The median sample concentration of BaP is 0.97 ppm. That is, of the 85 data points, 42 are above 0.97 ppm and 42 are below 0.97 ppm. In 71 of the 85 data points, BaP was detected. These statistics indicate that BaP is pervasive throughout the lime pond area and further support the conclusion that BaP is present within the historical fill material and not present due to any plant process discharge or related activity. No historical process at the Newark plant would account for the direct production of BaP. Further attemps by Praxair to reduce the average BaP concentration would require an onerous cleanup effort, above and beyond the intent of the hot spot excavations. Praxair contends such a cleanup would seem futile due to the continuous off-site sources of BaP.

It is documented[1] that BaP is not produced on a commercial scale in the United States. BaP is, in fact, known to be a by-product of combustion of fossil fuels including coal, gasoline, fuel oil and diesel fuel.[2] Appendix D contains copies of the reference material sources for further information.

Praxair believes that the presence of BaP in the lime pond fill material is a historic fill condition, the result of the cumulative effect of decades of fossil fuel combustion in the Newark area which continues even today.

Coal combustion was especially prevalent in the Newark industrial area, where the Praxair site is located. Gasoline and diesel fuel combustion have been and continue to be prevalent in the area. Currently, ongoing operations, in the immediate vicinity of the Praxair site, burn fossil fuels. The New Jersey Turnpike, located less than 200 yards from the property, has been in continuous operation for over 40 years.

The NJDEPE is utilizing the conservative non-residential surficial soil cleanup guidance of 0.66 ppm for BaP. In conjunction with the suspected carcinogenicity of BaP, NJDEPE determined this cleanup guidance using the BaP potency factor for EPA's 1983 health effects assessment of BaP[3]. By comparison with other organic compounds with better documented toxicities, however, BaP appears to be less of a human health threat in either the ingestion or inhalation scenario. Benzene, a known carcinogen for example, currently has a non-residential surficial soil cleanup guidance of 13 ppm.

NJDEPE's policy utilizes the proposed soil cleanup standards as guidance on a case by case basis. In this case, the BaP is pervasive in the lime pond area in relatively low concentrations. As stated above, Praxair has completed the removal of hot spots with confirmatory postexcavation soil sample analyses. Groundwater sampling analytical data collected during this

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[1] Marshall Sittig, Handbook of Toxic and Hazardous Chemicals and Carcinogens, 2nd, ed., (Park Ridge, NJ: Noyes Publications, 1985), pp. 118-119.

[2] "Sixth Annual Report on Carcinogens Summary 1991," U.S. Dept. of Health and Human Services, 1991, pp. 327-333.

"Toxicological Profile for Benzo(a)pyrene," ATSDR, Atlanta, GA, May 1990, p. 73.

[3] "Technical Basis and Background for Cleanup Standards for Contaminated Sites," NJDEPE, January 24, 1992, p. 20.

ISRA investigation indicate there have been no impacts to groundwater from facility operations, nor is there any indication of BaP in groundwater.

Praxair's research indicates that the source of BaP in the lime pond area is not from a direct Praxair plant process, but most likely is a by-product of fossil fuel combustion accumulated over an extensive period. Arguably the low concentrations of BaP, the lack of an on-site source, and the ongoing off-site sources of BaP call for NJDEPE's flexible application of its guidance in this case. In further support, Praxair reiterates the future use of the entire facility property will remain non-residential and the property will be deed noticed as such.

Based on the foregoing, no further actions are proposed for the lime pond area.

TABLE 1

LIME POND AREA
INVESTIGATIVE AND
POSTEXCAVATION
SOIL SAMPLING

ANALYTICAL RESULTS
SUMMARY

PRAXAIR, INC. FACILITY
NEWARK, NEW JERSEY

SAMPLE IDENTIFICATION	LP-6A	LP-6B	LP-7A	LP-7B	LP-8 A	LP-8 B	LP-8 C	LP-8 D	LP-8 E	LP-9A	LP-9B	LP-10A	LP-10B
SAMPLE DATE	05/26/93	05/26/93	05/26/93	05/26/93	8/5/93	8/5/93	8/5/93	8/5/93	8/5/93	05/26/93	05/26/93	05/26/93	05/26/93
SAMPLE DEPTH BELOW GRADE	0 to 0.5'	1.5 to 2.0'	0 to 0.5'	1.5 to 2.0'	1.5 to 2.0'	1.5 to 2.0'	1.5 to 2.0'	1.5 to 2.0'	2.0 to 2.5'	0 to 0.5'	1.5 to 2.0'	0 to 0.5'	1.5 to 2.0'
Arsenic	15	20	11	16	13	11	8.6	24	11	7.1	4.4	15	0.91
Lead	930	1000	1000	170	1300	1200	1000	1900	1200	530	490	1100	13
Benzo(a)Pyrene	0.48	0.58	1.5	1.05	3.2	9.9	3.6	1.2	2.4	ND	ND	1.2	ND
(Alternative BaP sample date)					9/8/93	9/8/93	9/8/93	9/8/93	9/8/93				

"ND" indicates compound is not detected above the detection limit.

"NA" indicates sample was not analyzed for this parameter.

TABLE 1

LIME POND AREA INVESTIGATIVE AND POSTEXCAVATION SOIL SAMPLING

ANALYTICAL RESULTS SUMMARY

PRAXAIR, INC. FACILITY NEWARK, NEW JERSEY

SAMPLE IDENTIFICATION	LP-11									LP-14			
	A	B	C	D	E	LP-12A	LP-12B	LP-13A	LP-13B	A-4	B-3	C-3	D-4
SAMPLE DATE	8/5/93	8/5/93	8/5/93	8/5/93	8/5/93	05/26/93	05/26/93	05/26/93	05/26/93	8/24/93	8/24/93	8/24/93	8/24/93
SAMPLE DEPTH BELOW GRADE	1.5 to 2.0'	1.5 to 2.0'	1.5 to 2.0'	1.5 to 2.0'	2.0 to 2.5'	0 to 0.5'	1.5 to 2.0'	0 to 0.5'	1.5 to 2.0'	3.0 to 3.5'	3.0 to 3.5'	3.0 to 3.5'	3.0 to 3.5'
Arsenic	NA	NA	NA	NA	NA	21	0.61	7.9	21	NA	NA	NA	19.8
Lead	2300	1100	830	820	1400	2300	17	590	570	NA	NA	NA	NA
Benzo(a)Pyrene	0.54	0.45	0.71	0.46	0.94	ND	ND	0.7	4	1.06	1.6	0.76	0.62
(Alternative BaP sample date)	9/8/93	9/8/93	9/8/93	9/8/93	9/8/93					9/8/93			9/8/93

"ND" indicates compound is not detected above the detection limit

"NA" indicates sample was not analyzed for this parameter.

TABLE 1

LIME POND AREA INVESTIGATIVE AND POSTEXCAVATION SOIL SAMPLING

ANALYTICAL RESULTS SUMMARY

PRAXAIR, INC. FACILITY NEWARK, NEW JERSEY

SAMPLE IDENTIFICATION	LP-14 E-4	LP-15A	LP-15B	LP-16A	LP-16B	LP-17 A	LP-17 B-2	LP-17 C	LP-17 D	LP-17 E-2	LP-18 A	LP-18 B	LP-18 C
SAMPLE DATE	8/24/93	05/26/93	05/26/93	05/26/93	05/26/93	8/5/93	8/14/93	8/5/93	8/5/93	8/14/93	8/5/93	8/5/93	8/5/93
SAMPLE DEPTH BELOW GRADE	3.5 to 4.0'	0 to 0.5'	1.5 to 2.0'	0 to 0.5'	1.5 to 2.0'	1.5 to 2.0'	2.5 to 3.0'	1.5 to 2.0'	1.5 to 2.0'	3.0 to 3.5'	1.5 to 2.0'	1.5 to 2.0'	1.5 to 2.0'
Arsenic	NA	11	5.5	9.9	11	22	17	23	25	17	24	17	29
Lead	NA	550	220	1000	1000	1500	1450	2400	1900	NA	1400	1500	2200
Benzo(a)Pyrene	5.9	1.02	1.8	ND	ND	0.45	0.63	0.43	0.21	1.6	1.3	0.97	0.86
(Alternative BaP sample date)	9/8/93					9/8/93	9/8/93	9/8/93	9/8/93	9/8/93	9/8/93	9/8/93	9/8/93

"ND" indicates compound is not detected above the detection limit.

"NA" indicates sample was not analyzed for this parameter.

TABLE 1

LIME POND AREA
INVESTIGATIVE AND
POSTEXCAVATION
SOIL SAMPLING

ANALYTICAL RESULTS
SUMMARY

PRAXAIR, INC. FACILITY
NEWARK, NEW JERSEY

SAMPLE IDENTIFICATION	LP-18		LP-19					LP-20A	LP-20B	LP-21			
	D	E	A-2	B	C	D	E			A	B	C	D
SAMPLE DATE	8/5/93	8/5/93	8/14/93	8/5/93	8/5/93	8/5/93	8/5/93	05/26/93	05/26/93	8/5/93	8/5/93	8/5/93	8/5/93
SAMPLE DEPTH BELOW GRADE	1.5 to 2.0'	2.0 to 2.5'	1.5 to 2.0'	1.5 to 2.0'	1.5 to 2.0'	1.5 to 2.0'	2.0 to 2.5'	0 to 0.5'	1.5 to 2.0'	1.5 to 2.0'	1.5 to 2.0'	1.5 to 2.0'	1.5 to 2.0'
Arsenic	11	20	NA	NA	NA	NA	NA	11	ND	NA	NA	NA	NA
Lead	1600	1300	440	1800	2000	1900	770	780	80	1100	670	970	1400
Benzo(a)Pyrene	4.1	1.4	1.8	3.2	4.7	1.2	3.4	0.73	ND	0.59	0.59	0.49	1.09
(Alternative BaP sample date)	9/8/93	9/8/93	9/8/93	9/8/93	9/8/93	9/8/93	9/8/93			9/8/93	9/8/93	9/8/93	9/8/93

"ND" indicates compound is not detected above the detection limit.

"NA" indicates sample was not analyzed for this parameter.

TABLE 1

LIME POND AREA
INVESTIGATIVE AND
POSTEXCAVATION
SOIL SAMPLING

ANALYTICAL RESULTS
SUMMARY

PRAXAIR, INC. FACILITY
NEWARK, NEW JERSEY

SAMPLE IDENTIFICATION	LP-21 E	LP-22A	LP-22B	LP-23 A-2	LP-23 B	LP-23 C	LP-23 D	LP-23 E	LP-24 A	LP-24 B	LP-24 C	LP-24 D-3	LP-24 E-3
SAMPLE DATE	8/5/93	05/27/93	05/27/93	8/14/93	8/5/93	8/5/93	8/5/93	8/5/93	8/5/93	8/5/93	8/5/93	8/24/93	8/24/93
SAMPLE DEPTH BELOW GRADE	2.0 to 2.5'	0 to 0.5'	1.5 to 2.0'	1.5 to 2.0'	1.5 to 2.0'	1.5 to 2.0'	1.5 to 2.0'	2.0 to 2.5'	1.5 to 2.0'	1.5 to 2.0'	1.5 to 2.0'	8.0 to 8.5'	8.0 to 8.5'
Arsenic	NA	14	12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	1200	1300	1500	23	1400	770	880	900	NA	NA	NA	NA	NA
Benzo(a)Pyrene	0.68	ND	ND	0.059	0.33	0.33	9.2	1.03	1.4	0.72	1.4	3	3
(Alternative BaP sample date)	9/8/93			9/8/93	9/8/93	9/8/93	9/8/93	9/8/93					

"ND" indicates compound is not detected above the detection limit.

"NA" indicates sample was not analyzed for this parameter.

TABLE 1

LIME POND AREA
INVESTIGATIVE AND
POSTEXCAVATION
SOIL SAMPLING

ANALYTICAL RESULTS
SUMMARY

PRAXAIR, INC. FACILITY
NEWARK, NEW JERSEY

SAMPLE IDENTIFICATION	LP-25 A-2	LP-25 B	LP-25 C	LP-25 D-2	LP-25 E	LP-26A	LP-26B	LP-27 A	LP-27 B-2	LP-27 C-2	LP-27 D	LP-27 E	LP-28A
SAMPLE DATE	8/14/93	8/5/93	8/5/93	8/14/93	8/5/93	05/27/93	05/27/93	8/5/93	8/24/93	8/24/93	8/5/93	8/5/93	05/27/93
SAMPLE DEPTH BELOW GRADE	1.5 to 2.0'	1.5 to 2.0'	1.5 to 2.0'	1.5 to 2.0'	2.0 to 2.5'	0 to 0.5'	1.5 to 2.0'	1.5 to 2.0'	1.5 to 2.0'	1.5 to 2.0'	1.5 to 2.0'	1.5 to 2.0'	0 to 0.5'
Arsenic	NA	NA	NA	NA	NA	13	14	NA	NA	NA	NA	NA	18
Lead	2300	2000	2000	1000	1400	1200	1500	1200	NA	1030	1900	2200	900
Benzo(a)Pyrene	2.7	1.3	1.8	1.5	3.2	ND	ND	1.3	0.66	1.7	1.06	4.4	2
(Alternative BaP sample date)	9/8/93	9/8/93	9/8/93	9/8/93	9/8/93			9/8/93		9/8/93	9/8/93	9/8/93	

"ND" indicates compound is not detected above the detection limit.

"NA" indicates sample was not analyzed for this parameter.

TABLE 1

LIME POND AREA INVESTIGATIVE AND POSTEXCAVATION SOIL SAMPLING

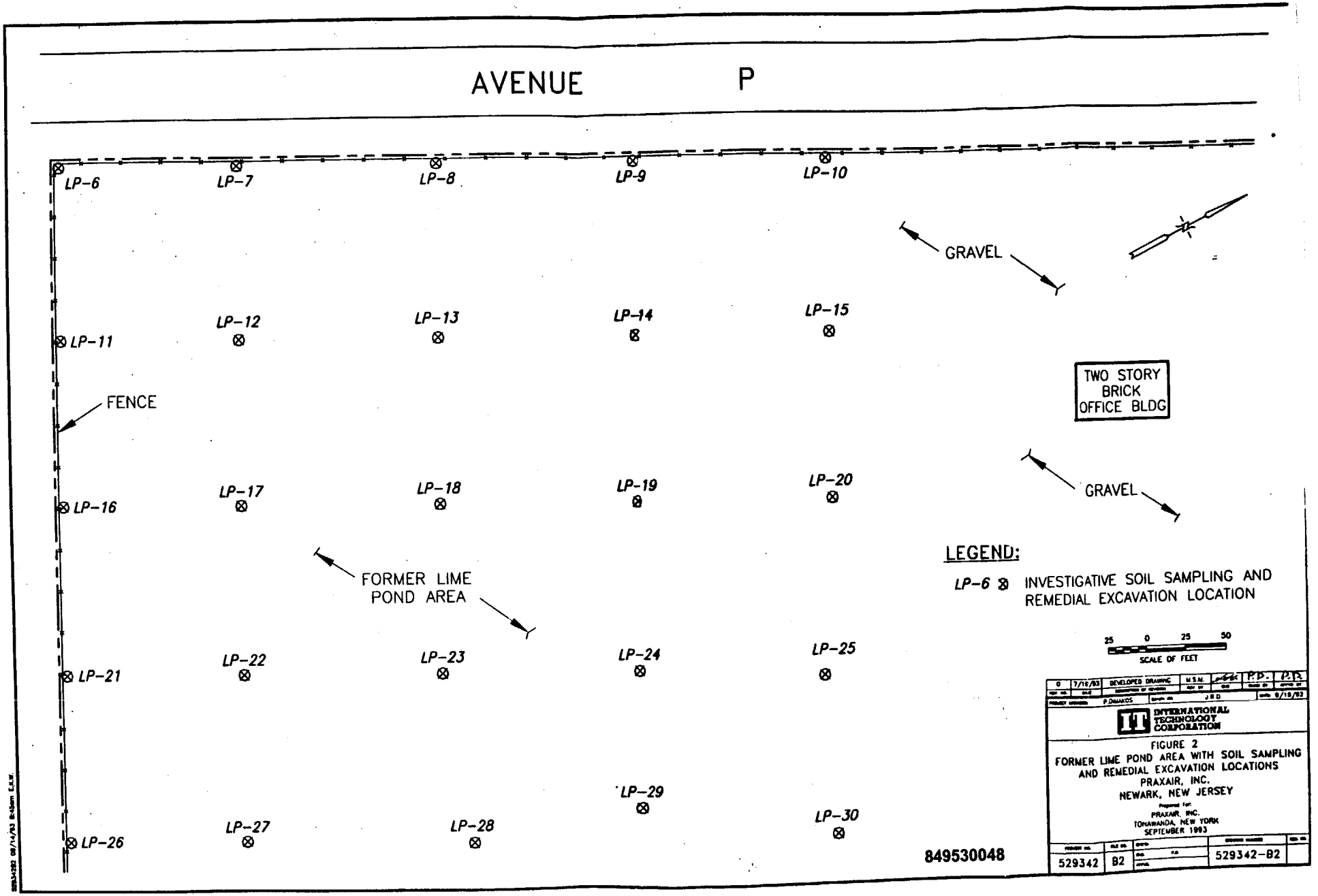
ANALYTICAL RESULTS SUMMARY

PRAXAIR, INC. FACILITY NEWARK, NEW JERSEY

SAMPLE IDENTIFICATION	LP-28B	LP-29A	LP-29B	LP-30 A-2	LP-30 B	LP-30 C	LP-30 D	LP-30 E-2	Total Sample Points	AVERAGE CONC. (ppm)
SAMPLE DATE	05/27/93	05/27/93	05/27/93	8/14/93	8/5/93	8/5/93	8/5/93	8/14/93		
SAMPLE DEPTH BELOW GRADE	1.5 to 2.0'	0 to 0.5'	1.5 to 2.0'	2.5 to 3.0'	1.5 to 2.0'	1.5 to 2.0'	1.5 to 2.0'	3.o to 3.5'		
Arsenic	15	4.9	7.5	14	17	20	9.2	32	47	14.283
Lead	920	280	850	NA	NA	NA	NA	NA	69	1164.4
Benzo(a)Pyrene (Alternative BaP sample date)	ND	ND	0.76	NA	1.2	0.86	1	0.83	85	1.445

"ND" indicates compound is not detected above the detection limit.

"NA" indicates sample was not analyzed for this parameter.


AVENUE P
LP-6
LP-7
LP-8
LP-9
LP-10
GRAVEL
LP-11
LP-12
LP-13
LP-14
LP-15
TWO STORY BRICK OFFICE BLDG
FENCE
LP-16
LP-17
LP-18
LP-19
LP-20
GRAVEL
FORMER LIME POND AREA
LP-21
LP-22
LP-23
LP-24
LP-25
LP-26
LP-27
LP-28
LP-29
LP-30
LEGEND:
LP-6 INVESTIGATIVE SOIL SAMPLING AND REMEDIAL EXCAVATION LOCATION
25 0 25 50
SCALE OF FEET
INTERNATIONAL TECHNOLOGY CORPORATION
FIGURE 2
FORMER LIME POND AREA WITH SOIL SAMPLING AND REMEDIAL EXCAVATION LOCATIONS
PRAXAIR, INC.
NEWARK, NEW JERSEY
PRAXAIR, INC.
TONAWANDA, NEW YORK
SEPTEMBER 1993
529342
B2
529342-B2
849530048

APPENDIX A

PRAXAIR LETTER TO NJDEPE

PRAXAIR

Praxair, Inc.
Industrial Avenue
P.O. Box 237
Keasbey, NJ 08832
Tel (908) 738-4000
Fax (908) 738-9586

August 4, 1993.

Joseph Goliszewski, Case Manager
New Jersey Department of Environmental
Protection and Energy
Division of Responsible Party Site Remediation
Bureau of Environmental Evaluation and Cleanup
Responsibility Assessment
CN 028
Trenton, NJ 08625-0028

Re: Linde Gases of the Mid-Atlantic, Newark, New Jersey Facility
ISRA Case No. 90254

Dear Mr. Goliszewski,

This is to memorialize our telephone conference of August 3, 1993 in which we discussed the progress of the Newark site remediation. Our conference call consisted of Paul Dimakos of IT Corporation, yourself and myself.

As we understand, there are three remaining issues to be resolved.

- Chromium in blast furnace cinder slag as exhibited in the waste oil tank Area Of Concern (AOC)
- Metals contamination in the cylinder stripping sump AOC.
- Metals contamination in the lime pond.

The chromium in the cinder slag material has been addressed through slag sampling and a literature search documenting the presence of chromium in slag material to be predominantly in the trivalent form. You indicated that the Remedial Investigative Report (RIR) submitted on July 23, 1993 contains sufficient supporting documentation for the DEPE to grant a No Further Action request for the waste oil tank AOC and other slag related AOC, provided these areas are addressed by an Engineering Control, which already exists by way of the gravel cover, and by an Institutional Control in the form of a deed notice that the area remains non-residential.

849530050

The metals contamination in the cylinder stripping sump AOC has been resolved by hot spot removal with post excavation sampling. We believe that upon review of the RIR, the DEPE will agree with the No Further Action request.

The lime pond area, therefore, remains the one last AOC to be resolved. In the July 24, RIR Praxair proposed a proactive strategy to remediate this area through hot spot removal and lime treatment. This proposal was intended to be a starting point for discussion with the DEPE to determine whether such actions are a reasonable approach to resolving this AOC.

You indicated that hot spot removal and lime treatment are reasonable and acceptable to the DEPE. You further indicated that under the historic fill provisions of ISRA the lime pond area may only require hot spot removal provided the average concentration of contaminants of concern are within levels acceptable to the DEPE. In the case of lead and arsenic, which are two of the contaminants of concern, you indicated, and we understood, that DEPE would accept average concentrations of less than 20 ppm for arsenic, and up to 1200 ppm for lead.

We also understood that under these conditions the lime pond area would necessarily be subject to an Institutional Control in the form of a deed notice that this area remain non-residential.

Based on this telephone discussion Praxair will proceed with lime pond hot spot removal. However we do not wish to discount the possibility that lime treatment may be necessary if we cannot demonstrate through post excavation sampling that the average concentrations of lead and arsenic cannot be reduced to the stated acceptable levels.

Thank you for your efforts in expediting technical review of the RIR in time for our phone discussion. We greatly appreciate your help and assistance in bringing this case that much closer to completion.

Very truly yours,

N. A. DiFranco
Manager, Environmental Affairs

NAD/mm

cc: P. Dimakos

APPENDIX B

TEST PIT CLASSIFICATION LOGS

INTERNATIONAL TECHNOLOGY CORPORATION

TEST PIT CLASSIFICATION LOG

PROJECT NAME Praxair - Newark TEST PIT NO. LP - 8 PAGE 1 OF 1

PROJECT NUMBER 529342 001 APPROX. ELEV. _____ DATE August 5, 1993

FIELD ENG./GEO Paul Schatz

LOCATION Newark, New Jersey

EQUIPMENT USED Case 580 Tire Mounted Backhoe

PIT DIMENSIONS: 6' (LENGTH) x 7' (WIDTH) x 2' (DEPTH) = 84 ft³ (VOLUME)

GROUNDWATER LEVEL DATA		
DATE	ACTUAL TIME	DEPTH
NOT ENCOUNTERED		X

DEPTH (ft)	SAMPLE NO AND TYPE	DESCRIPTION	U.S.C.S. SYMBOL	REMARKS
1		Brown, f.c. SAND, tr. silt, tr. f.c. gravel, some debris (bricks, concrete and asphalt) (Fill-dry)		
2		Excavation terminated at 2.0 feet		
3				
4				
5				

849530053

INTERNATIONAL TECHNOLOGY CORPORATION

TEST PIT CLASSIFICATION LOG

PROJECT NAME Praxair - Newark TEST PIT NO. LP - 11 PAGE 1 OF 1

PROJECT NUMBER 529342 001 APPROX. ELEV. _____ DATE August 5, 1993

FIELD ENG./GEO Paul Schatz

LOCATION Newark, New Jersey

EQUIPMENT USED Case 580 Tire Mounted Backhoe

PIT DIMENSIONS: 6' (LENGTH) x 7' (WIDTH) x 2' (DEPTH) = 84 ft³ (VOLUME)

GROUNDWATER LEVEL DATA		
DATE	ACTUAL TIME	DEPTH
	NOT ENCOUNTERED	X

DEPTH (ft)	SAMPLE NO. AND TYPE	DESCRIPTION	U.S.C.S. SYMBOL	REMARKS
1		Brown, f.c. SAND, tr. silt, tr. f.c. gravel and lime, tr. debris (bricks and glass and plastic) (Fill)		
2		Excavation terminated at 2.0 feet		
3				
4				
5				

849530054

INTERNATIONAL TECHNOLOGY CORPORATION

TEST PIT CLASSIFICATION LOG

PROJECT NAME Praxair - Newark TEST PIT NO. LP - 14 PAGE 1 OF 1

PROJECT NUMBER 529342 001 APPROX. ELEV. _____ DATE September 8, 1993

FIELD ENG./GEO Paul Schatz

LOCATION Newark, New Jersey

EQUIPMENT USED Case 580 Tire Mounted Backhoe

PIT DIMENSIONS: 11' (LENGTH) X 11' (WIDTH) X 4.5' (DEPTH) = 545 Ft^3 (VOLUME)

GROUNDWATER LEVEL DATA		
DATE	ACTUAL TIME	DEPTH
	NOT ENCOUNTERED	X

DEPTH (ft)	SAMPLE NO. AND TYPE	DESCRIPTION	U.S.C.S. SYMBOL	REMARKS
1		Dark brown-black, f.c. SAND, some silt, tr. f.c. gravel, tr. ash tr. debris (glass, wood, metal, plastic) (Fill)		
2				
3				
4				
5		Excavation terminated at 4.5 feet		

849530055

488-5-8

INTERNATIONAL TECHNOLOGY CORPORATION

TEST PIT CLASSIFICATION LOG

PROJECT NAME Praxair - Newark TEST PIT NO. LP - 17 PAGE 1 OF 1

PROJECT NUMBER 529342 001 APPROX. ELEV. _____ DATE August 14, 1993

FIELD ENG./GEO Paul Schatz

LOCATION Newark, New Jersey

EQUIPMENT USED Case 580 Tire Mounted Backhoe

PIT DIMENSIONS: 10.5' (LENGTH) X 6' (WIDTH) X 3' (DEPTH) = 189 ft³ (VOLUME)

GROUNDWATER LEVEL DATA		
DATE	ACTUAL TIME	DEPTH
	NOT ENCOUNTERED	X

DEPTH (ft)	SAMPLE NO. AND TYPE	DESCRIPTION	U.S.C.S. SYMBOL	REMARKS
1		Brown, f.c. silty SAND, tr. f.c. gravel, tr. debris (bricks, wires, pipes, plastic, glass) (Fill-dry)		
2				
3				
4		Excavation terminated at 3.0 feet		
5				

849530056

INTERNATIONAL TECHNOLOGY CORPORATION

TEST PIT CLASSIFICATION LOG

PROJECT NAME Praxair - Newark TEST PIT NO. LP - 18 PAGE 1 OF 1

PROJECT NUMBER 529342 001 APPROX. ELEV. _____ DATE August 5, 1993

FIELD ENG./GEO Paul Schatz

LOCATION Newark, New Jersey

EQUIPMENT USED Case 580 Tire Mounted Backhoe

PIT DIMENSIONS: 6' (LENGTH) x 7' (WIDTH) x 2' (DEPTH) = 84 ft³ (VOLUME)

GROUNDWATER LEVEL DATA		
DATE	ACTUAL TIME	DEPTH
	NOT ENCOUNTERED	X

DEPTH (ft)	SAMPLE NO. AND TYPE	DESCRIPTION	U.S.C.S. SYMBOL	REMARKS
1		Brown, F.c. SAND, tr. silt, tr. f.c. gravel tr. debris (wood, glass, plastic, concrete) (Fill-dry)		
2		Excavation terminated at 2.0 Feet		
3				
4				
5				

849530057

INTERNATIONAL TECHNOLOGY CORPORATION

TEST PIT CLASSIFICATION LOG

PROJECT NAME Praxair - Newark TEST PIT NO. LP - 19 PAGE 1 OF 1

PROJECT NUMBER 529342 001 APPROX. ELEV. _____ DATE August 14, 1993

FIELD ENG./GEO Paul Schatz

LOCATION Newark, New Jersey

EQUIPMENT USED Case 580 Tire Mounted Backhoe

PIT DIMENSIONS: 10' (LENGTH) X 8' (WIDTH) X 2' (DEPTH) = 160 ft^3 (VOLUME)

GROUNDWATER LEVEL DATA		
DATE	ACTUAL TIME	DEPTH
	NOT ENCOUNTERED	X

DEPTH (ft)	SAMPLE NO. AND TYPE	DESCRIPTION	U.S.C.S. SYMBOL	REMARKS
1		Grey-brown, silty SAND, some f.c. gravel, tr. debris (plastic, bricks, bottles) (Fill-dry)		
2		Excavation terminated at 2.0 feet		
3				
4				
5				

849530058

INTERNATIONAL TECHNOLOGY CORPORATION

TEST PIT CLASSIFICATION LOG

PROJECT NAME Praxair - Newark TEST PIT NO. LP - 21 PAGE 1 OF 1

PROJECT NUMBER 529342 001 APPROX. ELEV. _____ DATE August 5, 1993

FIELD ENG./GEO Paul Schatz

LOCATION Newark, New Jersey

EQUIPMENT USED Case 580 Tire Mounted Backhoe

PIT DIMENSIONS: 6' (LENGTH) X 7' (WIDTH) X 2' (DEPTH) = 84 ft³ (VOLUME)

GROUNDWATER LEVEL DATA		
DATE	ACTUAL TIME	DEPTH
	NOT ENCOUNTERED	X

DEPTH (ft)	SAMPLE NO. AND TYPE	DESCRIPTION	U.S.C.S. SYMBOL	REMARKS
1		Brown, f.c. SAND, tr. silt, tr. f.c. gravel, tr. debris (plastic, glass, wood) (Fill-dry)		
2		Excavation terminated at 2.0 Feet		
3				
4				
5				

849530059

488-5-87

INTERNATIONAL TECHNOLOGY CORPORATION

TEST PIT CLASSIFICATION LOG

PROJECT NAME Praxair - Newark TEST PIT NO. LP - 23 PAGE 1 OF 1

PROJECT NUMBER 529342 001 APPROX. ELEV. _____ DATE August 14, 1993

FIELD ENG./GEO Paul Schatz

LOCATION Newark, New Jersey

EQUIPMENT USED Case 580 Tire Mounted Backhoe

PIT DIMENSIONS: 10' (LENGTH) X 8' (WIDTH) X 2' (DEPTH) = 160 ft³ (VOLUME)

GROUNDWATER LEVEL DATA		
DATE	ACTUAL TIME	DEPTH
	NOT ENCOUNTERED	X

DEPTH (ft)	SAMPLE NO. AND TYPE	DESCRIPTION	U.S.C.S. SYMBOL	REMARKS
1		Brown, silty f.c. SAND, tr. f.c. gravel, tr. debris (wood, brick, concrete, plastic, glass) (Fill-dry)		
2		Excavation terminated at 2.0 feet		
3				
4				
5				

849530060

INTERNATIONAL TECHNOLOGY CORPORATION

TEST PIT CLASSIFICATION LOG

PROJECT NAME Praxair - Newark TEST PIT NO. LP - 24 PAGE 1 OF 1

PROJECT NUMBER 529342 001 APPROX. ELEV. _____ DATE August 24, 1993

FIELD ENG./GEO Paul Schatz

LOCATION Newark, New Jersey

EQUIPMENT USED Case 580 Tire Mounted Backhoe

PIT DIMENSIONS: 9.5' (LENGTH) x 12' (WIDTH) x 12' (DEPTH) = 1,368 ft³ (VOLUME)

GROUNDWATER LEVEL DATA		
DATE	ACTUAL TIME	DEPTH
8/24/93	10:50	8.5'
NOT ENCOUNTERED		

DEPTH (ft)	SAMPLE NO. AND TYPE	DESCRIPTION	U.S.C.S. SYMBOL	REMARKS
1		Brown, silty f.c. SAND, tr. f.c. gravel, tr. debris (glass, plastic, wood, brick) (Fill - dry)		
2				
3				
4				
5				
12		Excavation terminated at 12.0 feet		

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INTERNATIONAL TECHNOLOGY CORPORATION

TEST PIT CLASSIFICATION LOG

PROJECT NAME Praxair - Newark TEST PIT NO. LP - 25 PAGE 1 OF 1

PROJECT NUMBER 529342 001 APPROX. ELEV. _____ DATE August 5, 1993

FIELD ENG./GEO Paul Schatz

LOCATION Newark, New Jersey

EQUIPMENT USED Case 580 Tire Mounted Backhoe

PIT DIMENSIONS: 8' (LENGTH) x 9' (WIDTH) x 2' (DEPTH) = 144 ft³ (VOLUME)

GROUNDWATER LEVEL DATA		
DATE	ACTUAL TIME	DEPTH
	NOT ENCOUNTERED	X

DEPTH (ft)	SAMPLE NO. AND TYPE	DESCRIPTION	U.S.C.S. SYMBOL	REMARKS
1		Brown, silty f.c. SAND, tr. f.c. gravel, tr. debris (brick, bottles, pottery) (Fill - dry)		
2		Excavation terminated at 2.0 feet		
3				
4				
5				

849530062

INTERNATIONAL TECHNOLOGY CORPORATION

TEST PIT CLASSIFICATION LOG

PROJECT NAME Praxair - Newark TEST PIT NO. LP - 27 PAGE 1 OF 1

PROJECT NUMBER 529342 001 APPROX. ELEV. _____ DATE August 24, 1993

FIELD ENG./GEO Paul Schatz

LOCATION Newark, New Jersey

EQUIPMENT USED Case 580 Tire Mounted Backhoe

PIT DIMENSIONS: 35' (LENGTH) X 8.5' (WIDTH) X 2' (DEPTH) = 595 ft^3 (VOLUME)

GROUNDWATER LEVEL DATA		
DATE	ACTUAL TIME	DEPTH
8/24/93	11:05	3 feet
	NOT ENCOUNTERED	

DEPTH (ft)	SAMPLE NO. AND TYPE	DESCRIPTION	U.S.C.S. SYMBOL	REMARKS
1		Black-brown-grey, f.c. SAND, tr. silt, tr. f.c. gravel, tr. debris (wood, glass, plastic, brick, pipes) (Fill)		
2		Excavation terminated at 2.0 feet		
3				
4				
5				

849530063

INTERNATIONAL TECHNOLOGY CORPORATION

TEST PIT CLASSIFICATION LOG

PROJECT NAME Praxair - Newark TEST PIT NO. LP - 30 PAGE 1 OF 1

PROJECT NUMBER 529342 001 APPROX. ELEV. _____ DATE August 14, 1993

FIELD ENG./GEO. Paul Schatz

LOCATION Newark, New Jersey

EQUIPMENT USED Case 580 Tire Mounted Backhoe

PIT DIMENSIONS: 9' (LENGTH) X 8' (WIDTH) X 3' (DEPTH) = 216 ft^3 (VOLUME)

GROUNDWATER LEVEL DATA		
DATE	ACTUAL TIME	DEPTH
8/24/93	12:15	2.5 feet
	NOT ENCOUNTERED	

DEPTH (ft)	SAMPLE NO. AND TYPE	DESCRIPTION	U.S.C.S. SYMBOL	REMARKS
1		Brown, f.c. SAND, some silt, tr. f.c. gravel, tr. debris (brick, glass, wood) tr. ash (Fill-moist)		
2				
3		Excavation terminated at 3.0 feet		
4				

849530064

488-5-87

APPENDIX C

SAMPLE COLLECTION LOGS

INTERNATIONAL TECHNOLOGY CORPORATION

9/8/93 and

DATE	0	8	0	5	9	3
TIME						
PAGE 1 OF 1						
PAGE						
PROJECT NO. 529342						

SAMPLE COLLECTION LOG

PROJECT NAME Praxair - Newark

SAMPLE NO. LP - 8 A, B, C, D and E

SAMPLE LOCATION LP - 8

SAMPLE TYPE Soil - Grab

COMPOSITE ____ YES x NO

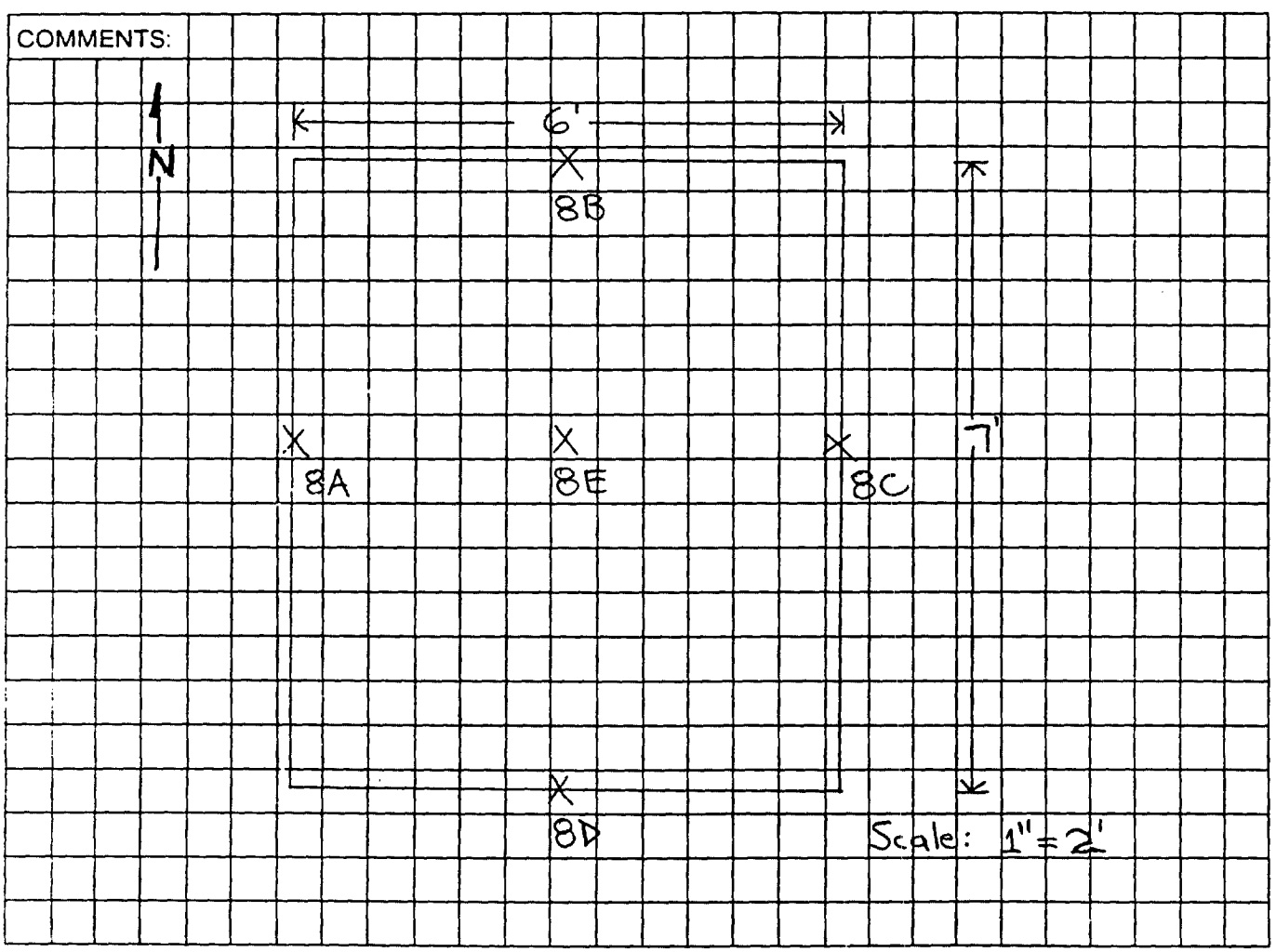
COMPOSITE TYPE ____

DEPTH OF SAMPLE 1.5 to 2.0 feet (A thru D) 2.0 to 2.5 feet (E)

WEATHER Sunny, 85°F

CONTAINERS USED	AMOUNT COLLECTED
8 oz. glass	8 oz.

COMMENTS:



PREPARED BY: Paul Dimakos

849530066

COMMENTS: (Continued)

DATE

TIME

PAGE ____ OF ____

PAGE

PROJECT NO.

PREPARED BY: _____

LEGEND

1. A SAMPLE COLLECTION LOG IS TO BE COMPLETED FOR EACH SAMPLE.
2. ALWAYS COMPLETE BOTH SIDES. IF SECOND SIDE IS NOT USED, DRAW A LINE THROUGH IT AND MARK N/A. FILL IN CONTROL BLOCK AND PREPARED BY
3. ALL ENTRIES ON LOG ARE TO BE COMPLETED, IF NOT APPLICABLE MARK N/A.
4. DATE: USE MONTH/DAY/YEAR; I.E., 10/30/85
5. TIME: USE 24-HOUR CLOCK: I.E., 1835 FOR 6:35 P.M.
6. PAGE: EACH SAMPLE TEAM SHOULD NUMBER PAGE _____ OF _____ FOR THE DAY'S ACTIVITIES FOR ALL SHEETS PREPARED ON A SINGLE DAY. I.E., IF THERE ARE A TOTAL OF 24 PAGES (INCLUDING FRONT AND BACK) NUMBER 1 OF 24, 2 OF 24, ETC.
7. SAMPLE LOCATION: USE BORING OR MONITORING WELL NUMBER, GRID LOCATION (TRANSECT), SAMPLING STATION I.D., OR COORDINATE TO PHYSICAL FEATURES WITH DISTANCES. INCLUDE SKETCH IN COMMENT SECTION IF NECESSARY.
8. SAMPLE TYPE: USE THE FOLLOWING - SOIL; WATER (SURFACE OR GROUND); AIR (FILTERS, TUBES, AMBIENT, PERSONNEL); SLUDGE; DRUM CONTENTS; OIL; VEGETATION; WIPE; SEDIMENT.
9. COMPOSITE TYPE: I.E., 24-HOUR, LIST SAMPLE NUMBERS IN COMPOSITE, SPATIAL COMPOSITE.
10. DEPTH OF SAMPLE: GIVE UNITS. WRITE OUT UNITS SUCH AS INCHES, FEET. DON'T USE ' OR ".
11. WEATHER: APPROXIMATE TEMPERATURE, SUN AND MOISTURE CONDITIONS.
12. CONTAINERS USED: LIST EACH CONTAINER TYPE AS NUMBER, VOLUME, MATERIAL (E.G., 2 - 1L GLASS; 4 - 40 ML GLASS VIAL; 1 - 400 ML PLASTIC, 1 - 3 INCH STEEL TUBE; 1 - 8 OZ. GLASS JAR)
13. AMOUNT COLLECTED: VOLUME IN CONTAINERS (E.G. 1/2 FULL).

INTERNATIONAL TECHNOLOGY CORPORATION

9/8/93 and

DATE	0	8	0	5	9	3
TIME						
PAGE 1 OF 1						
PAGE						
PROJECT NO. 529342						

SAMPLE COLLECTION LOG

PROJECT NAME Praxair - Newark

SAMPLE NO. LP - 11A, B, C, D, and E

SAMPLE LOCATION LP - 11

SAMPLE TYPE Soil - Grab

COMPOSITE ____ YES x NO

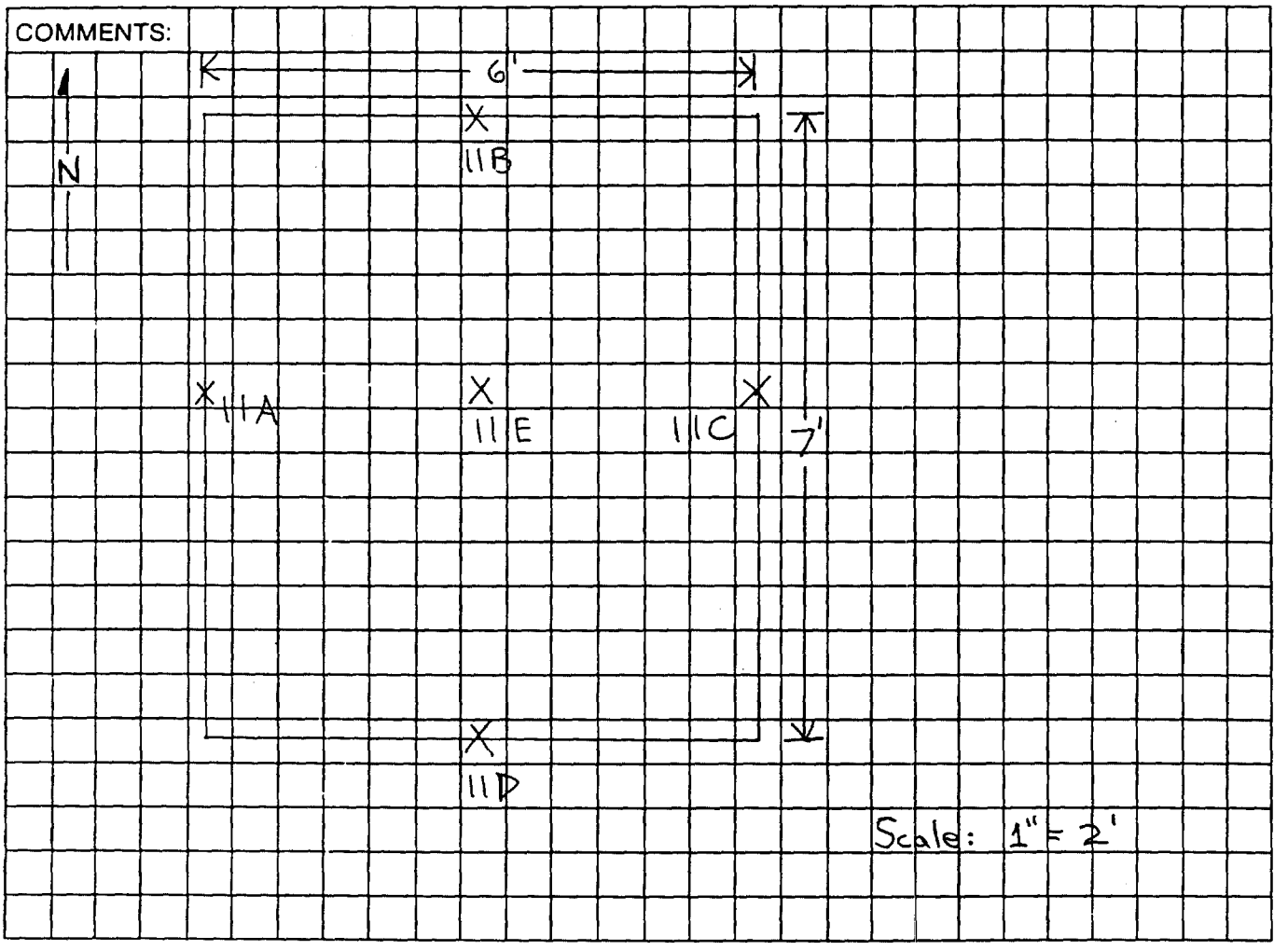
COMPOSITE TYPE ____

DEPTH OF SAMPLE 1.5 to 2.0 feet (A thru D) 2.0 to 2.5 feet (E)

WEATHER Sunny, 85°F

CONTAINERS USED	AMOUNT COLLECTED
8 oz. glass	8 oz.

COMMENTS:



PREPARED BY: Paul Dimakos

849530068

COMMENTS: (Continued)

DATE	
TIME	
PAGE ____ OF ____	
PAGE	
PROJECT NO.	

PREPARED BY: _____

LEGEND

1. A SAMPLE COLLECTION LOG IS TO BE COMPLETED FOR EACH SAMPLE.
2. ALWAYS COMPLETE BOTH SIDES. IF SECOND SIDE IS NOT USED, DRAW A LINE THROUGH IT AND MARK N/A. FILL IN CONTROL BLOCK AND PREPARED BY.
3. ALL ENTRIES ON LOG ARE TO BE COMPLETED, IF NOT APPLICABLE MARK N/A.
4. DATE: USE MONTH/DAY/YEAR; I.E., 10/30/85
5. TIME: USE 24-HOUR CLOCK; I.E., 1835 FOR 6:35 P.M.
6. PAGE: EACH SAMPLE TEAM SHOULD NUMBER PAGE _____ OF _____ FOR THE DAY'S ACTIVITIES FOR ALL SHEETS PREPARED ON A SINGLE DAY. I.E., IF THERE ARE A TOTAL OF 24 PAGES (INCLUDING FRONT AND BACK) NUMBER 1 OF 24, 2 OF 24, ETC.
7. SAMPLE LOCATION: USE BORING OR MONITORING WELL NUMBER, GRID LOCATION (TRANSECT), SAMPLING STATION I.D., OR COORDINATE TO PHYSICAL FEATURES WITH DISTANCES. INCLUDE SKETCH IN COMMENT SECTION IF NECESSARY.
8. SAMPLE TYPE: USE THE FOLLOWING - SOIL; WATER (SURFACE OR GROUND); AIR (FILTERS, TUBES, AMBIENT, PERSONNEL); SLUDGE; DRUM CONTENTS; OIL; VEGETATION; WIPE; SEDIMENT.
9. COMPOSITE TYPE: I.E., 24-HOUR, LIST SAMPLE NUMBERS IN COMPOSITE, SPATIAL COMPOSITE.
10. DEPTH OF SAMPLE: GIVE UNITS, WRITE OUT UNITS SUCH AS INCHES, FEET, DON'T USE ' OR ".
11. WEATHER: APPROXIMATE TEMPERATURE, SUN AND MOISTURE CONDITIONS.
12. CONTAINERS USED: LIST EACH CONTAINER TYPE AS NUMBER, VOLUME, MATERIAL (E.G., 2 - IL GLASS; 4 - 40 ML GLASS VIAL; 1 - 400 ML PLASTIC 1 - 3 INCH STEEL TUBE; 1 - 8 OZ. GLASS JAR)
13. AMOUNT COLLECTED: VOLUME IN CONTAINERS (E.G. 1/2 FULL).

8/24/93 and

INTERNATIONAL TECHNOLOGY CORPORATION

DATE	0	9	0	8	9	3
TIME						
PAGE 1 OF 1						
PAGE						
PROJECT NO. 529342						

SAMPLE COLLECTION LOG

PROJECT NAME Praxair - Newark

SAMPLE NO. LP - 14 A-4, B-3, C-3, D-4, and E-4

SAMPLE LOCATION LP - 14

SAMPLE TYPE Soil - Grab

COMPOSITE ____ YES x NO

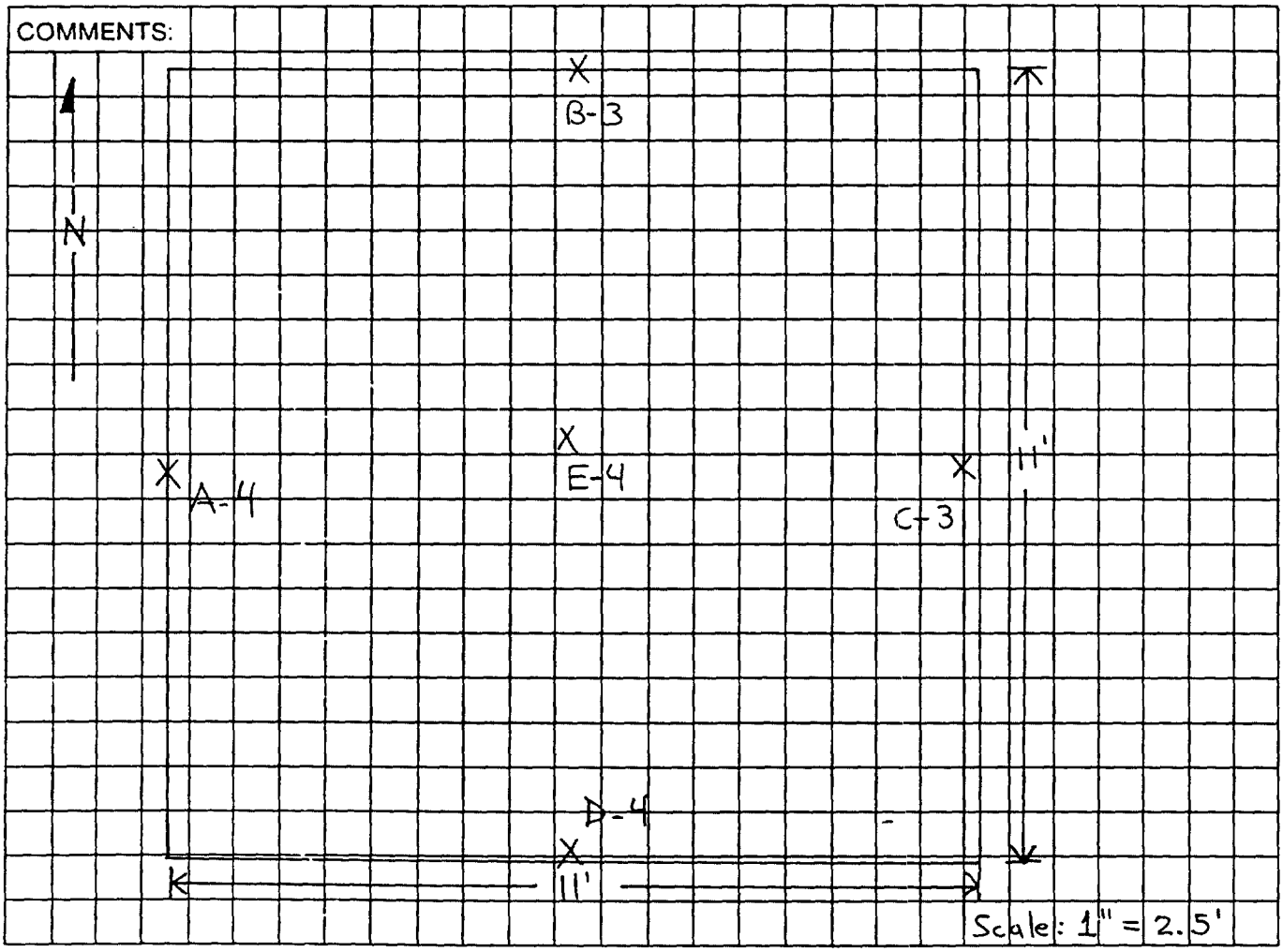
COMPOSITE TYPE 3.0 to 3.5 feet (B-3, C-3)

DEPTH OF SAMPLE 4.0 to 4.5 feet (A-4, D-4, E-4)

WEATHER Overcast, 60°F

CONTAINERS USED	AMOUNT COLLECTED
8 oz. glass	8 oz.

COMMENTS:



PREPARED BY: Paul Dimakos

849530070

COMMENTS: (Continued)

DATE	
TIME	
PAGE ____ OF ____	
PAGE	
PROJECT NO.	

PREPARED BY: _____

LEGEND

1. A SAMPLE COLLECTION LOG IS TO BE COMPLETED FOR EACH SAMPLE.
2. ALWAYS COMPLETE BOTH SIDES. IF SECOND SIDE IS NOT USED, DRAW A LINE THROUGH IT AND MARK N/A. FILL IN CONTROL BLOCK AND PREPARED BY.
3. ALL ENTRIES ON LOG ARE TO BE COMPLETED, IF NOT APPLICABLE MARK N/A.
4. DATE: USE MONTH/DAY/YEAR; I.E., 10/30/85
5. TIME: USE 24-HOUR CLOCK; I.E., 1835 FOR 6:35 P.M.
6. PAGE: EACH SAMPLE TEAM SHOULD NUMBER PAGE _____ OF _____ FOR THE DAY'S ACTIVITIES FOR ALL SHEETS PREPARED ON A SINGLE DAY, I.E., IF THERE ARE A TOTAL OF 24 PAGES (INCLUDING FRONT AND BACK) NUMBER 1 OF 24, 2 OF 24, ETC.
7. SAMPLE LOCATION: USE BORING OR MONITORING WELL NUMBER, GRID LOCATION (TRANSECT), SAMPLING STATION I.D., OR COORDINATE TO PHYSICAL FEATURES WITH DISTANCES. INCLUDE SKETCH IN COMMENT SECTION IF NECESSARY.
8. SAMPLE TYPE: USE THE FOLLOWING - SOIL; WATER (SURFACE OR GROUND); AIR (FILTERS, TUBES, AMBIENT, PERSONNEL); SLUDGE; DRUM CONTENTS; OIL; VEGETATION; WIPE; SEDIMENT.
9. COMPOSITE TYPE: I.E., 24-HOUR, LIST SAMPLE NUMBERS IN COMPOSITE, SPATIAL COMPOSITE.
10. DEPTH OF SAMPLE: GIVE UNITS, WRITE OUT UNITS SUCH AS INCHES, FEET. DON'T USE ' OR ".
11. WEATHER: APPROXIMATE TEMPERATURE, SUN AND MOISTURE CONDITIONS.
12. CONTAINERS USED: LIST EACH CONTAINER TYPE AS NUMBER, VOLUME, MATERIAL (E.G., 2 - 1L GLASS; 4 - 40 ML GLASS VIAL; 1 - 400 ML PLASTIC; 1 - 3 INCH STEEL TUBE; 1 - 8 OZ. GLASS JAR).
13. AMOUNT COLLECTED: VOLUME IN CONTAINERS (E.G. 1/2 FULL).

849530071

125-10-85

8/5/93
8/14/93
and

INTERNATIONAL TECHNOLOGY CORPORATION

DATE	0	9	0	8	9	3
TIME						
PAGE 1 OF 1						
PAGE						
PROJECT NO. 529342						

SAMPLE COLLECTION LOG

PROJECT NAME Praxair - Newark

SAMPLE NO. LP - 17 A, B-2, C, D and E-2

SAMPLE LOCATION LP - 17

SAMPLE TYPE Soil - Grab

COMPOSITE ____ YES x NO

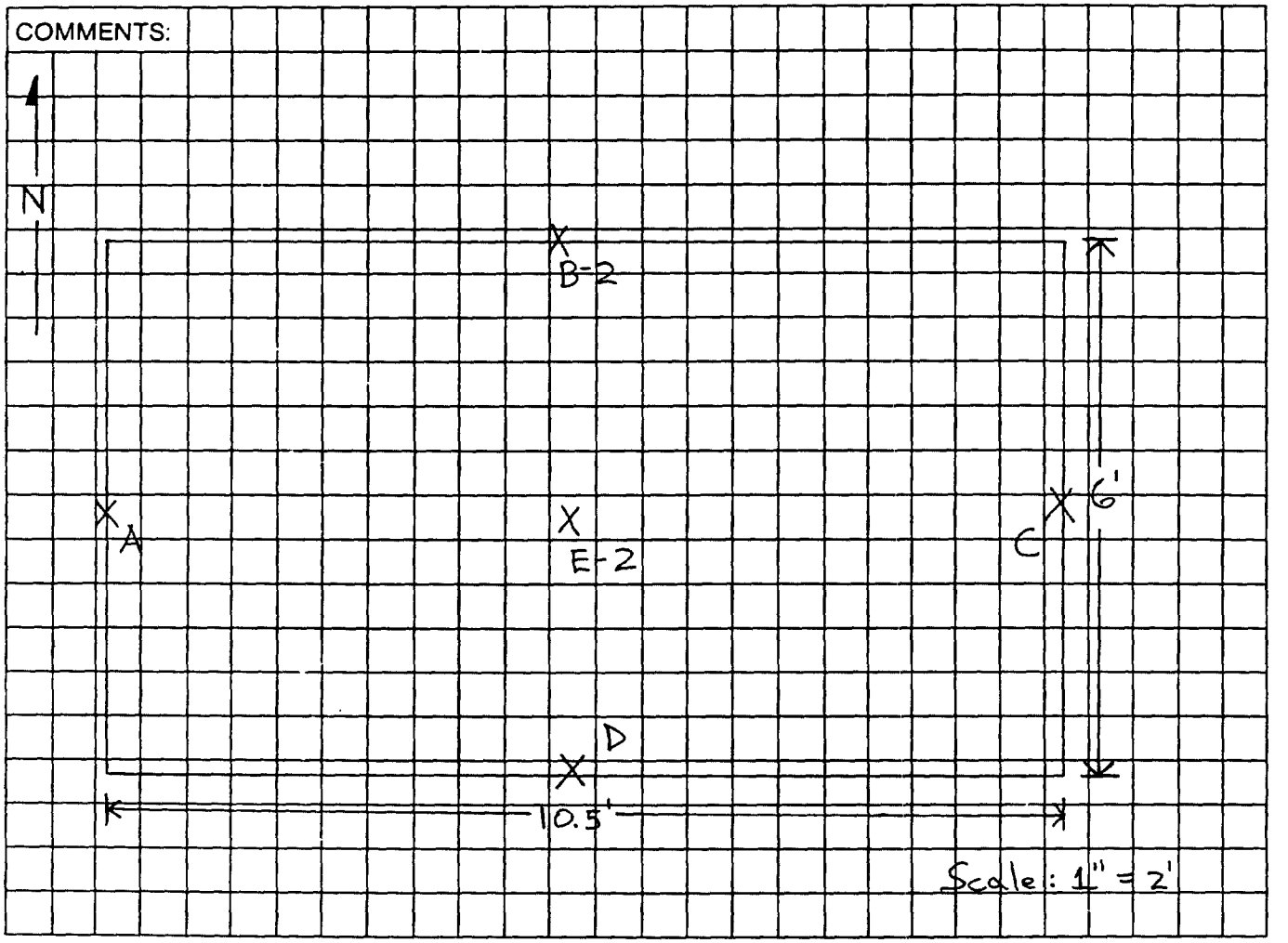
COMPOSITE TYPE 1.5 to 2.0 feet (A, C and D)

DEPTH OF SAMPLE 2.5 to 3.0 feet (B-2)
3.0 to 3.5 feet (E-2)

WEATHER ____

CONTAINERS USED	AMOUNT COLLECTED
8 oz. glass	8 oz.

COMMENTS:



PREPARED BY: Paul Dimakos

849530072

COMMENTS: (Continued)

DATE	
TIME	
PAGE ____ OF ____	
PAGE	
PROJECT NO.	

PREPARED BY: _____

LEGEND

1. A SAMPLE COLLECTION LOG IS TO BE COMPLETED FOR EACH SAMPLE.
2. ALWAYS COMPLETE BOTH SIDES. IF SECOND SIDE IS NOT USED, DRAW A LINE THROUGH IT AND MARK N/A. FILL IN CONTROL BLOCK AND PREPARED BY.
3. ALL ENTRIES ON LOG ARE TO BE COMPLETED, IF NOT APPLICABLE MARK N/A.
4. DATE: USE MONTH/DAY/YEAR; I.E., 10/30/85
5. TIME: USE 24-HOUR CLOCK; I.E., 1835 FOR 6:35 P.M.
6. PAGE: EACH SAMPLE TEAM SHOULD NUMBER PAGE _____ OF _____ FOR THE DAY'S ACTIVITIES FOR ALL SHEETS PREPARED ON A SINGLE DAY. I.E., IF THERE ARE A TOTAL OF 24 PAGES (INCLUDING FRONT AND BACK) NUMBER 1 OF 24, 2 OF 24, ETC.
7. SAMPLE LOCATION: USE BORING OR MONITORING WELL NUMBER, GRID LOCATION (TRANSECT), SAMPLING STATION I.D., OR COORDINATE TO PHYSICAL FEATURES WITH DISTANCES. INCLUDE SKETCH IN COMMENT SECTION IF NECESSARY.
8. SAMPLE TYPE: USE THE FOLLOWING - SOIL; WATER (SURFACE OR GROUND); AIR (FILTERS, TUBES, AMBIENT, PERSONNEL); SLUDGE; DRUM CONTENTS; OIL; VEGETATION; WIPE; SEDIMENT.
9. COMPOSITE TYPE: I.E., 24-HOUR, LIST SAMPLE NUMBERS IN COMPOSITE, SPATIAL COMPOSITE.
10. DEPTH OF SAMPLE: GIVE UNITS, WRITE OUT UNITS SUCH AS INCHES, FEET. DON'T USE ' OR ".
11. WEATHER: APPROXIMATE TEMPERATURE, SUN AND MOISTURE CONDITIONS.
12. CONTAINERS USED: LIST EACH CONTAINER TYPE AS NUMBER, VOLUME, MATERIAL (E.G., 2 - 1L GLASS; 4 - 40 ML GLASS VIAL; 1 - 400 ML PLASTIC 1 - 3 INCH STEEL TUBE; 1 - 8 OZ. GLASS JAR)
13. AMOUNT COLLECTED: VOLUME IN CONTAINERS (E.G. 1/2 FULL).

849530073

125-10-85

INTERNATIONAL TECHNOLOGY CORPORATION

8/5/93 and

DATE	0	9	0	8	9	3
TIME						
PAGE 1 OF 1						
PAGE						
PROJECT NO. 529342						

SAMPLE COLLECTION LOG

PROJECT NAME Praxair - Newark

SAMPLE NO. LP - 18 A, B, C, D and E

SAMPLE LOCATION LP - 18

SAMPLE TYPE Soil - Grab

COMPOSITE ____ YES x NO

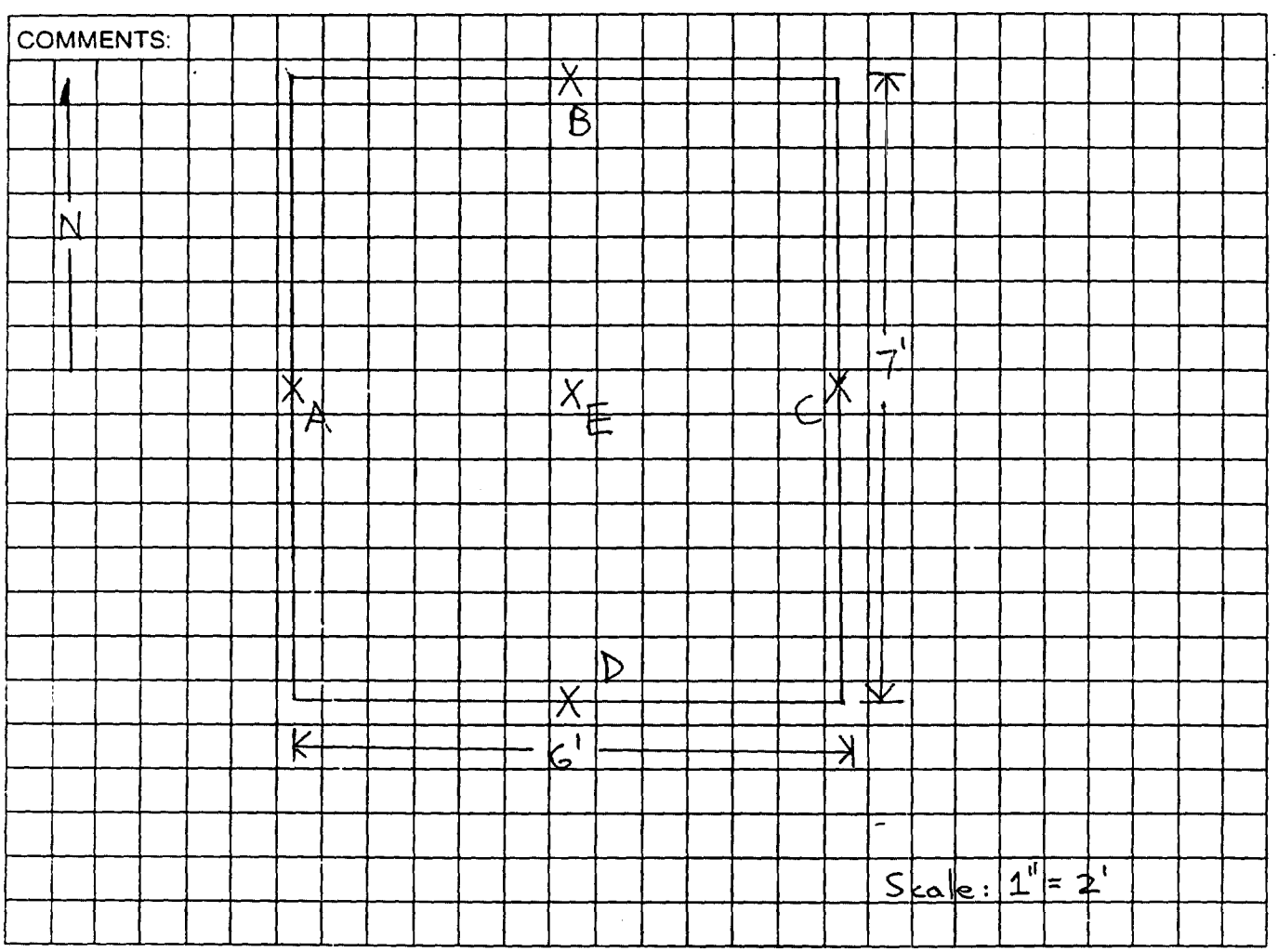
COMPOSITE TYPE ____

DEPTH OF SAMPLE 1.5 to 2.0 feet (A thru D) 2.0 to 2.5 feet (E)

WEATHER ____

CONTAINERS USED	AMOUNT COLLECTED
8 oz. glass	8 oz.

COMMENTS:



PREPARED BY: Paul Dimakos

849530074

COMMENTS: (Continued)

DATE	
TIME	
PAGE ____ OF ____	
PAGE	
PROJECT NO.	

PREPARED BY: _____

LEGEND

1. A SAMPLE COLLECTION LOG IS TO BE COMPLETED FOR EACH SAMPLE.
2. ALWAYS COMPLETE BOTH SIDES. IF SECOND SIDE IS NOT USED, DRAW A LINE THROUGH IT AND MARK N/A. FILL IN CONTROL BLOCK AND PREPARED BY.
3. ALL ENTRIES ON LOG ARE TO BE COMPLETED, IF NOT APPLICABLE MARK N/A.
4. DATE: USE MONTH/DAY/YEAR; I.E., 10/30/85
5. TIME: USE 24-HOUR CLOCK; I.E., 1835 FOR 6:35 P.M.
6. PAGE: EACH SAMPLE TEAM SHOULD NUMBER PAGE _____ OF _____ FOR THE DAY'S ACTIVITIES FOR ALL SHEETS PREPARED ON A SINGLE DAY. I.E., IF THERE ARE A TOTAL OF 24 PAGES (INCLUDING FRONT AND BACK) NUMBER 1 OF 24, 2 OF 24, ETC.
7. SAMPLE LOCATION: USE BORING OR MONITORING WELL NUMBER, GRID LOCATION (TRANSECT), SAMPLING STATION I.D., OR COORDINATE TO PHYSICAL FEATURES WITH DISTANCES. INCLUDE SKETCH IN COMMENT SECTION IF NECESSARY.
8. SAMPLE TYPE: USE THE FOLLOWING - SOIL; WATER (SURFACE OR GROUND); AIR (FILTERS, TUBES, AMBIENT, PERSONNEL); SLUDGE; DRUM CONTENTS; OIL; VEGETATION; WIPE; SEDIMENT.
9. COMPOSITE TYPE: I.E., 24-HOUR, LIST SAMPLE NUMBERS IN COMPOSITE, SPATIAL COMPOSITE.
10. DEPTH OF SAMPLE: GIVE UNITS, WRITE OUT UNITS SUCH AS INCHES, FEET. DON'T USE ' OR ".
11. WEATHER: APPROXIMATE TEMPERATURE, SUN AND MOISTURE CONDITIONS.
12. CONTAINERS USED: LIST EACH CONTAINER TYPE AS NUMBER, VOLUME, MATERIAL (E.G., 2 - 1L GLASS; 4 - 40 ML GLASS VIAL; 1 - 400 ML PLASTIC; 1 - 3 INCH STEEL TUBE; 1 - 8 OZ. GLASS JAR)
13. AMOUNT COLLECTED: VOLUME IN CONTAINERS (E.G. 1/2 FULL).

849530075

125-10-85

8/5/93
8/14/93
and

INTERNATIONAL TECHNOLOGY CORPORATION

DATE	0	9	0	8	9	3
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PAGE 1 OF 1						
PAGE						
PROJECT NO. 529342						

SAMPLE COLLECTION LOG

PROJECT NAME Praxair - Newark

SAMPLE NO. LP - 19 A-2, B, C, D and E

SAMPLE LOCATION LP - 19

SAMPLE TYPE Soil - Grab

COMPOSITE ____ YES x NO

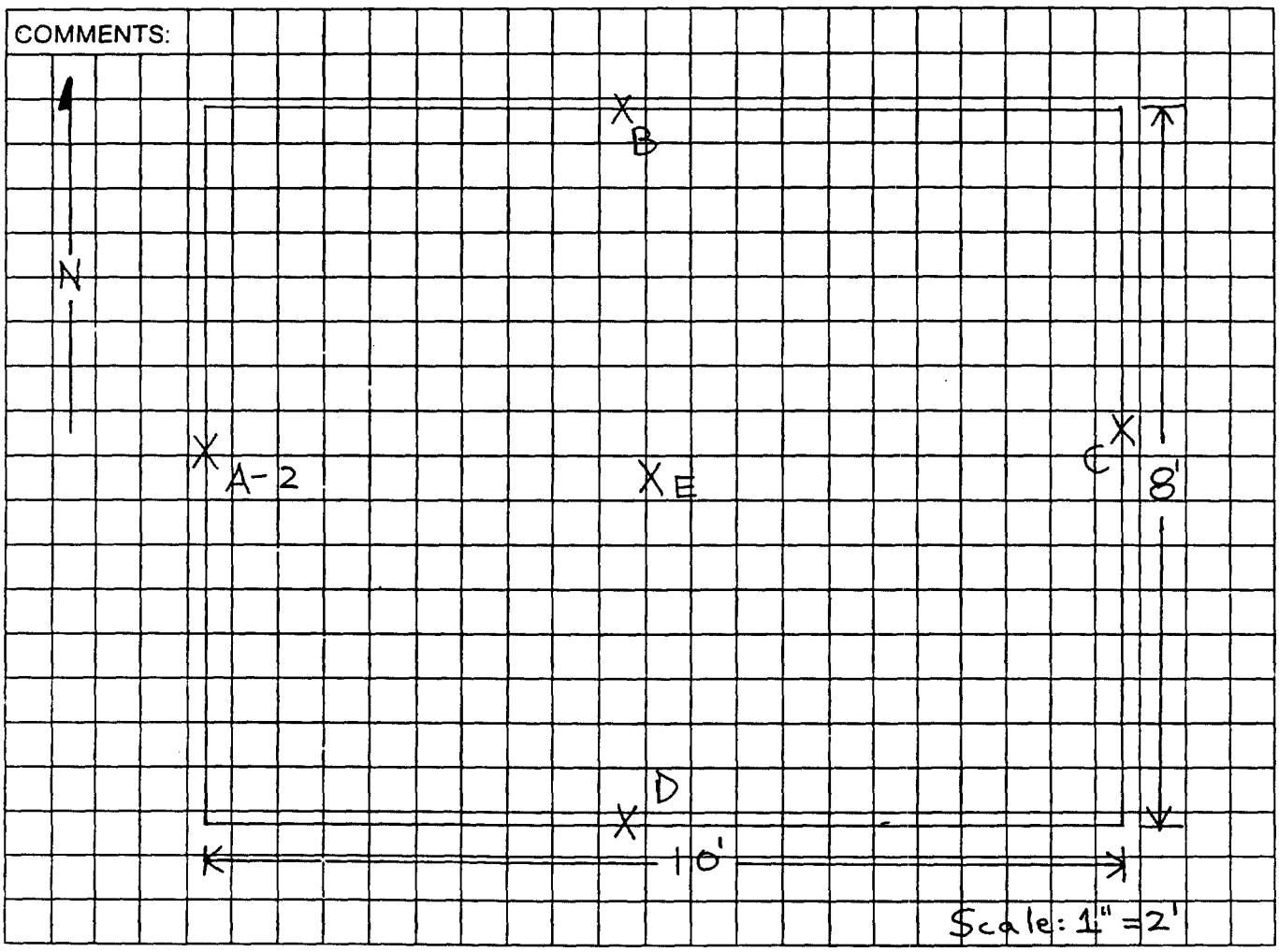
COMPOSITE TYPE

DEPTH OF SAMPLE 1.5 to 2.0 feet (A thru D)
2.0 to 2.5 feet (E)

WEATHER

CONTAINERS USED	AMOUNT COLLECTED
8 oz. glass	8 oz.

COMMENTS:



PREPARED BY: Paul Dimakos

849530076

COMMENTS: (Continued)

DATE	
TIME	
PAGE ____ OF ____	
PAGE	
PROJECT NO.	

PREPARED BY: _____

LEGEND

1. A SAMPLE COLLECTION LOG IS TO BE COMPLETED FOR EACH SAMPLE.
2. ALWAYS COMPLETE BOTH SIDES. IF SECOND SIDE IS NOT USED, DRAW A LINE THROUGH IT AND MARK N/A. FILL IN CONTROL BLOCK AND PREPARED BY.
3. ALL ENTRIES ON LOG ARE TO BE COMPLETED, IF NOT APPLICABLE MARK N/A.
4. DATE: USE MONTH/DAY/YEAR; I.E., 10/30/85
5. TIME: USE 24-HOUR CLOCK; I.E., 1835 FOR 6:35 P.M.
6. PAGE: EACH SAMPLE TEAM SHOULD NUMBER PAGE _____ OF _____ FOR THE DAY'S ACTIVITIES FOR ALL SHEETS PREPARED ON A SINGLE DAY. I.E., IF THERE ARE A TOTAL OF 24 PAGES (INCLUDING FRONT AND BACK) NUMBER 1 OF 24, 2 OF 24, ETC.
7. SAMPLE LOCATION: USE BORING OR MONITORING WELL NUMBER, GRID LOCATION (TRANSECT), SAMPLING STATION I.D., OR COORDINATE TO PHYSICAL FEATURES WITH DISTANCES. INCLUDE SKETCH IN COMMENT SECTION IF NECESSARY.
8. SAMPLE TYPE: USE THE FOLLOWING - SOIL; WATER (SURFACE OR GROUND); AIR (FILTERS, TUBES, AMBIENT, PERSONNEL); SLUDGE; DRUM CONTENTS; OIL; VEGETATION; WIPE; SEDIMENT.
9. COMPOSITE TYPE: I.E., 24-HOUR, LIST SAMPLE NUMBERS IN COMPOSITE, SPATIAL COMPOSITE.
10. DEPTH OF SAMPLE: GIVE UNITS, WRITE OUT UNITS SUCH AS INCHES, FEET. DON'T USE ' OR ".
11. WEATHER: APPROXIMATE TEMPERATURE, SUN AND MOISTURE CONDITIONS.
12. CONTAINERS USED: LIST EACH CONTAINER TYPE AS NUMBER, VOLUME, MATERIAL (E.G., 2 - 1L GLASS; 4 - 40 ML GLASS VIAL; 1 - 400 ML PLASTIC; 1 - 3 INCH STEEL TUBE; 1 - 8 OZ. GLASS JAR).
13. AMOUNT COLLECTED: VOLUME IN CONTAINERS (E.G. 1/2 FULL).

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125-10-85

INTERNATIONAL TECHNOLOGY CORPORATION

8/5/93 and

DATE	0	9	0	8	9	3
TIME						
PAGE 1 OF 1						
PAGE						
PROJECT NO. 529342						

SAMPLE COLLECTION LOG

PROJECT NAME Praxair - Newark

SAMPLE NO. LP - 21 A, B, C, D and E

SAMPLE LOCATION LP - 21

SAMPLE TYPE Soil - Grab

COMPOSITE ____ YES X NO

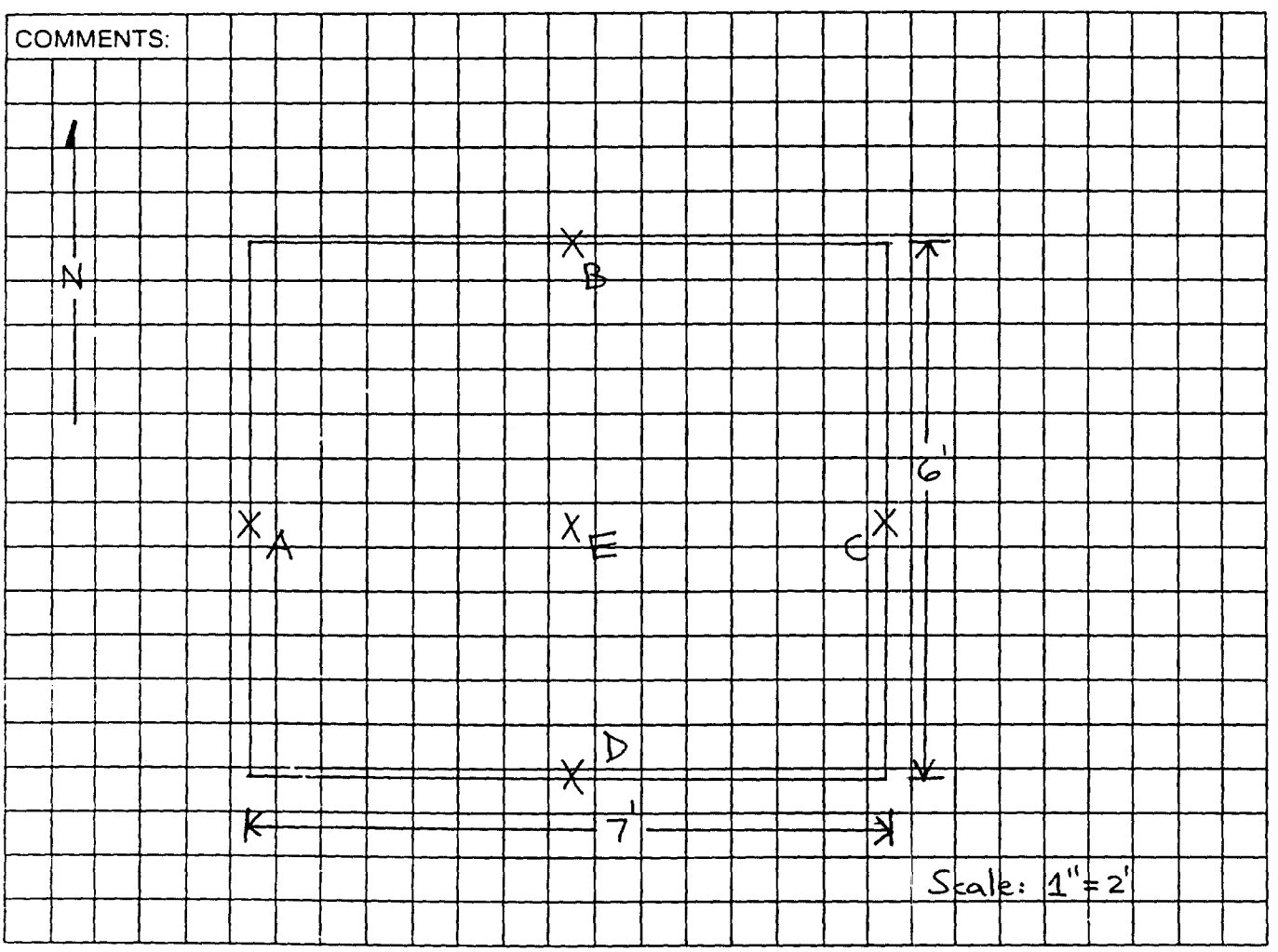
COMPOSITE TYPE 1.5 to 2.0 feet (A thru D)

DEPTH OF SAMPLE 2.0 to 2.5 feet (E)

WEATHER ____

CONTAINERS USED	AMOUNT COLLECTED
8 oz. glass	8 oz.

COMMENTS:



PREPARED BY: Paul Dimakos

849530078

COMMENTS: (Continued)

DATE	
TIME	
PAGE ____ OF ____	
PAGE	
PROJECT NO.	

PREPARED BY: _____

LEGEND

1. A SAMPLE COLLECTION LOG IS TO BE COMPLETED FOR EACH SAMPLE.
2. ALWAYS COMPLETE BOTH SIDES. IF SECOND SIDE IS NOT USED, DRAW A LINE THROUGH IT AND MARK N/A. FILL IN CONTROL BLOCK AND PREPARED BY.
3. ALL ENTRIES ON LOG ARE TO BE COMPLETED, IF NOT APPLICABLE MARK N/A.
4. DATE: USE MONTH/DAY/YEAR; I.E., 10/30/85
5. TIME: USE 24-HOUR CLOCK; I.E., 1835 FOR 6:35 P.M.
6. PAGE: EACH SAMPLE TEAM SHOULD NUMBER PAGE _____ OF _____ FOR THE DAY'S ACTIVITIES FOR ALL SHEETS PREPARED ON A SINGLE DAY. I.E., IF THERE ARE A TOTAL OF 24 PAGES (INCLUDING FRONT AND BACK) NUMBER 1 OF 24, 2 OF 24, ETC.
7. SAMPLE LOCATION: USE BORING OR MONITORING WELL NUMBER, GRID LOCATION (TRANSECT), SAMPLING STATION I.D., OR COORDINATE TO PHYSICAL FEATURES WITH DISTANCES. INCLUDE SKETCH IN COMMENT SECTION IF NECESSARY.
8. SAMPLE TYPE: USE THE FOLLOWING - SOIL; WATER (SURFACE OR GROUND); AIR (FILTERS, TUBES, AMBIENT, PERSONNEL); SLUDGE; DRUM CONTENTS; OIL; VEGETATION; WIPE; SEDIMENT.
9. COMPOSITE TYPE: I.E., 24-HOUR, LIST SAMPLE NUMBERS IN COMPOSITE, SPATIAL COMPOSITE.
10. DEPTH OF SAMPLE: GIVE UNITS. WRITE OUT UNITS SUCH AS INCHES, FEET. DON'T USE ' OR ".
11. WEATHER: APPROXIMATE TEMPERATURE, SUN AND MOISTURE CONDITIONS.
12. CONTAINERS USED: LIST EACH CONTAINER TYPE AS NUMBER, VOLUME, MATERIAL (E.G., 2 - 1L GLASS; 4 - 40 ML GLASS VIAL; 1 - 400 ML PLASTIC, 1 - 3 INCH STEEL TUBE; 1 - 8 OZ. GLASS JAR)
13. AMOUNT COLLECTED: VOLUME IN CONTAINERS (E.G. 1/2 FULL).

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125-10-85

8/5/93
8/14/93
and

INTERNATIONAL TECHNOLOGY CORPORATION

DATE	0	9	0	8	9	3
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PAGE						
PROJECT NO. 529342						

SAMPLE COLLECTION LOG

PROJECT NAME Praxair - Newark

SAMPLE NO. LP - 23 A2, B, C, D and E

SAMPLE LOCATION LP - 23

SAMPLE TYPE Soil - Grab

COMPOSITE ____ YES x NO

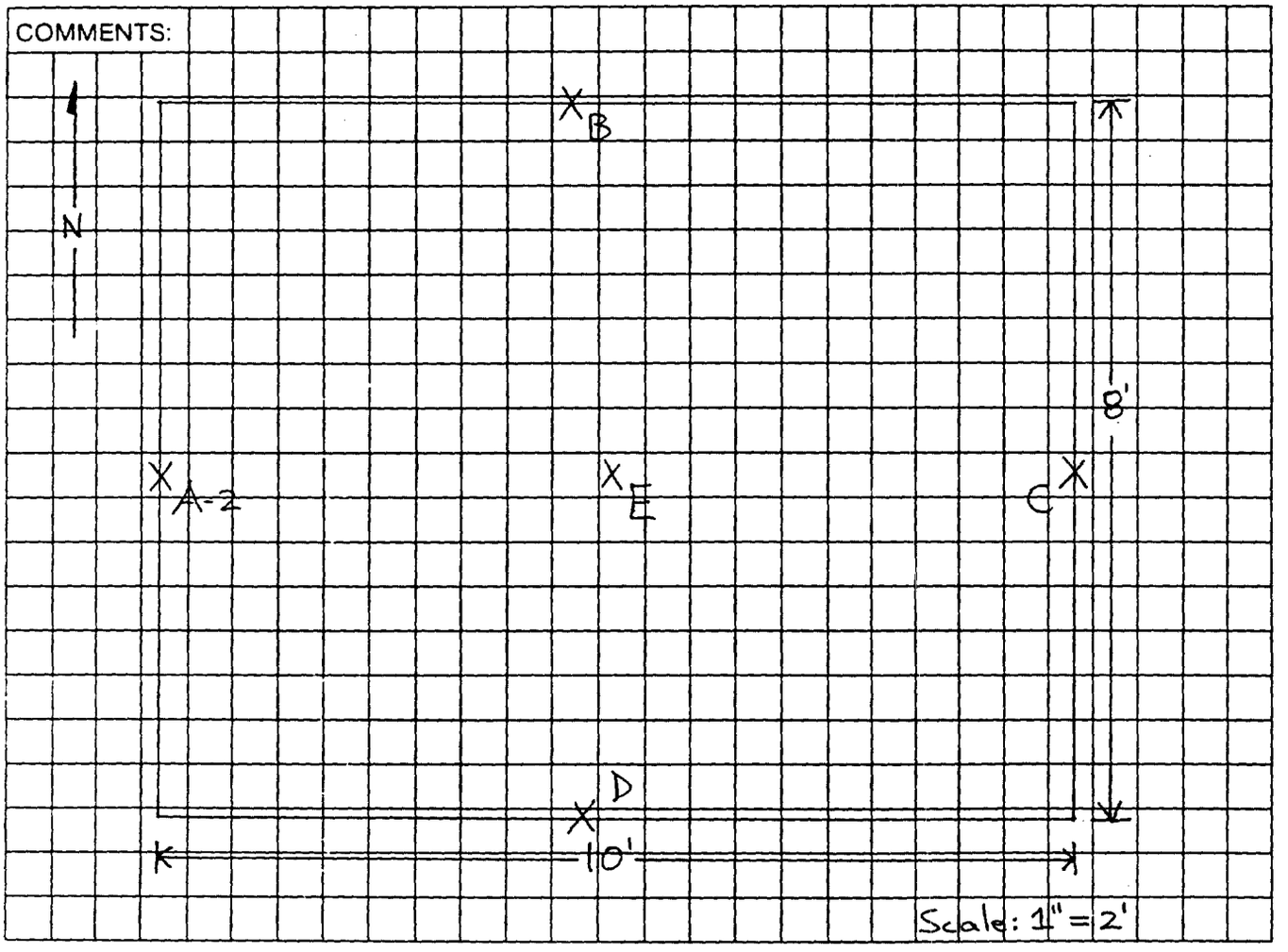
COMPOSITE TYPE 1.5 to 2.0 feet (A-2, B thru D)

DEPTH OF SAMPLE 2.0 to 2.5 feet (E)

WEATHER ____

CONTAINERS USED	AMOUNT COLLECTED
8 oz. glass	8 oz.

COMMENTS:



PREPARED BY: Paul Dimakos

849530080

COMMENTS: (Continued)

DATE	
TIME	
PAGE ____ OF ____	
PAGE	
PROJECT NO.	

PREPARED BY: _____

LEGEND

1. A SAMPLE COLLECTION LOG IS TO BE COMPLETED FOR EACH SAMPLE.
2. ALWAYS COMPLETE BOTH SIDES. IF SECOND SIDE IS NOT USED, DRAW A LINE THROUGH IT AND MARK N/A. FILL IN CONTROL BLOCK AND PREPARED BY.
3. ALL ENTRIES ON LOG ARE TC BE COMPLETED. IF NOT APPLICABLE MARK N/A.
4. DATE: USE MONTH/DAY/YEAR; I.E., 10/30/85
5. TIME: USE 24-HOUR CLOCK; i.E., 1835 FOR 6:35 P.M.
6. PAGE: EACH SAMPLE TEAM SHOULD NUMBER PAGE _____ OF _____ FOR THE DAY'S ACTIVITIES FOR ALL SHEETS PREPARED ON A SINGLE DAY. I.E., IF THERE ARE A TOTAL OF 24 PAGES (INCLUDING FRONT AND BACK) NUMBER 1 OF 24, 2 OF 24, ETC.
7. SAMPLE LOCATION: USE BORING OR MONITORING WELL NUMBER, GRID LOCATION (TRANSECT), SAMPLING STATION I.D., OR COORDINATE TO PHYSICAL FEATURES WITH DISTANCES. INCLUDE SKETCH IN COMMENT SECTION IF NECESSARY.
8. SAMPLE TYPE: USE THE FOLLOWING - SOIL; WATER (SURFACE OR GROUND); AIR (FILTERS, TUBES, AMBIENT, PERSONNEL); SLUDGE; DRUM CONTENTS; OIL; VEGETATION; WIPE; SEDIMENT.
9. COMPOSITE TYPE: I.E., 24-HOUR, LIST SAMPLE NUMBERS IN COMPOSITE, SPATIAL COMPOSITE.
10. DEPTH OF SAMPLE: GIVE UNITS, WRITE OUT UNITS SUCH AS INCHES, FEET. DON'T USE ' OR ".
11. WEATHER: APPROXIMATE TEMPERATURE, SUN AND MOISTURE CONDITIONS.
12. CONTAINERS USED: LIST EACH CONTAINER TYPE AS NUMBER, VOLUME, MATERIAL (E.G., 2 - IL GLASS; 4 - 40 ML GLASS VIAL; 1 - 400 ML PLASTIC. 1 - 3 INCH STEEL TUBE; 1 - 8 OZ. GLASS JAR).
13. AMOUNT COLLECTED: VOLUME IN CONTAINERS (E.G. 1/2 FULL).

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125-10-85

INTERNATIONAL TECHNOLOGY CORPORATION

8/5/93 and

DATE	0	8	2	4	9	3
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PROJECT NO. 529342						

SAMPLE COLLECTION LOG

PROJECT NAME Praxair - Newark

SAMPLE NO. LP - 24

SAMPLE LOCATION LP - 24

SAMPLE TYPE Soil - Grab

COMPOSITE ____ YES x NO

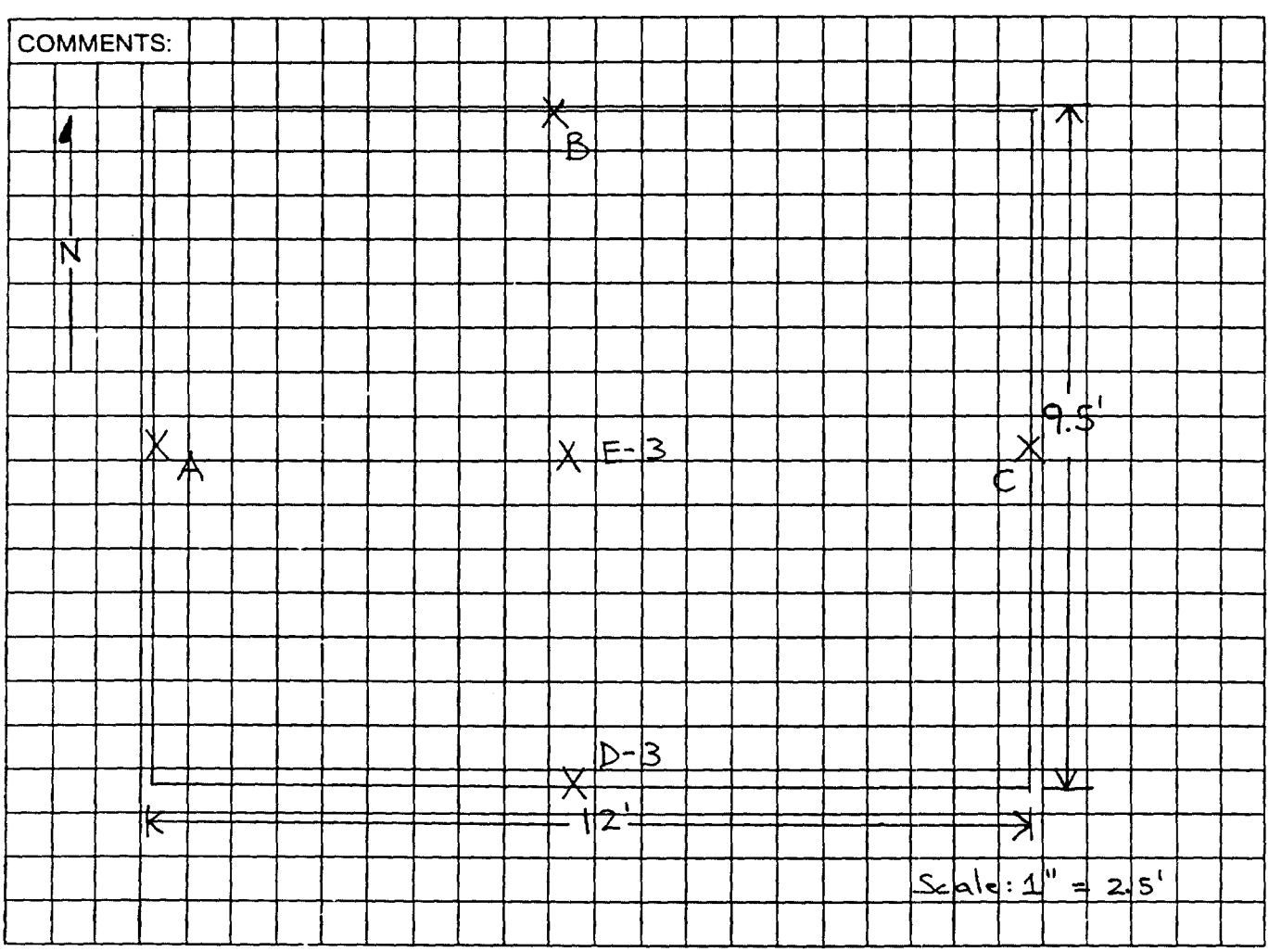
COMPOSITE TYPE 1.5 to 2.0 feet (A thru C)

DEPTH OF SAMPLE 8.0 to 8.5 feet (D and E)

WEATHER ____

CONTAINERS USED	AMOUNT COLLECTED
8 oz. glass	8 oz.

COMMENTS:



PREPARED BY: Paul Dimakos

849530082

COMMENTS: (Continued)

DATE	
TIME	
PAGE ____ OF ____	
PAGE	
PROJECT NO.	

PREPARED BY: _____

LEGEND

1. A SAMPLE COLLECTION LOG IS TO BE COMPLETED FOR EACH SAMPLE.
2. ALWAYS COMPLETE BOTH SIDES. IF SECOND SIDE IS NOT USED, DRAW A LINE THROUGH IT AND MARK N/A. FILL IN CONTROL BLOCK AND PREPARED BY.
3. ALL ENTRIES ON LOG ARE TO BE COMPLETED, IF NOT APPLICABLE MARK N/A.
4. DATE: USE MONTH/DAY/YEAR; I.E., 10/30/85
5. TIME: USE 24-HOUR CLOCK; I.E., 1835 FOR 6:35 P.M.
6. PAGE: EACH SAMPLE TEAM SHOULD NUMBER PAGE _____ OF _____ FOR THE DAY'S ACTIVITIES FOR ALL SHEETS PREPARED ON A SINGLE DAY, I.E., IF THERE ARE A TOTAL OF 24 PAGES (INCLUDING FRONT AND BACK) NUMBER 1 OF 24, 2 OF 24, ETC.
7. SAMPLE LOCATION: USE BORING OR MONITORING WELL NUMBER, GRID LOCATION (TRANSECT), SAMPLING STATION I.D., OR COORDINATE TO PHYSICAL FEATURES WITH DISTANCES. INCLUDE SKETCH IN COMMENT SECTION IF NECESSARY.
8. SAMPLE TYPE: USE THE FOLLOWING - SOIL; WATER (SURFACE OR GROUND); AIR (FILTERS, TUBES, AMBIENT, PERSONNEL); SLUDGE; DRUM CONTENTS; OIL; VEGETATION; WIPE; SEDIMENT.
9. COMPOSITE TYPE: I.E., 24-HOUR, LIST SAMPLE NUMBERS IN COMPOSITE, SPATIAL COMPOSITE.
10. DEPTH OF SAMPLE: GIVE UNITS, WRITE OUT UNITS SUCH AS INCHES, FEET. DON'T USE ' OR ".
11. WEATHER: APPROXIMATE TEMPERATURE, SUN AND MOISTURE CONDITIONS.
12. CONTAINERS USED: LIST EACH CONTAINER TYPE AS NUMBER, VOLUME, MATERIAL (E.G., 2 - IL GLASS; 4 - 40 ML GLASS VIAL; 1 - 400 ML PLASTIC; 1 - 3 INCH STEEL TUBE; 1 - 8 OZ. GLASS JAR).
13. AMOUNT COLLECTED: VOLUME IN CONTAINERS (E.G. 1/2 FULL).

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125-10-85

8/5/93
8/14/93 and

INTERNATIONAL TECHNOLOGY CORPORATION

DATE	0	9	0	8	9	3
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PAGE						
PROJECT NO. 529342						

SAMPLE COLLECTION LOG

PROJECT NAME Praxair - Newark

SAMPLE NO. LP - 25 A-2, B, C, D-2 and E

SAMPLE LOCATION LP - 25

SAMPLE TYPE Soil - Grab

COMPOSITE ____ YES x NO

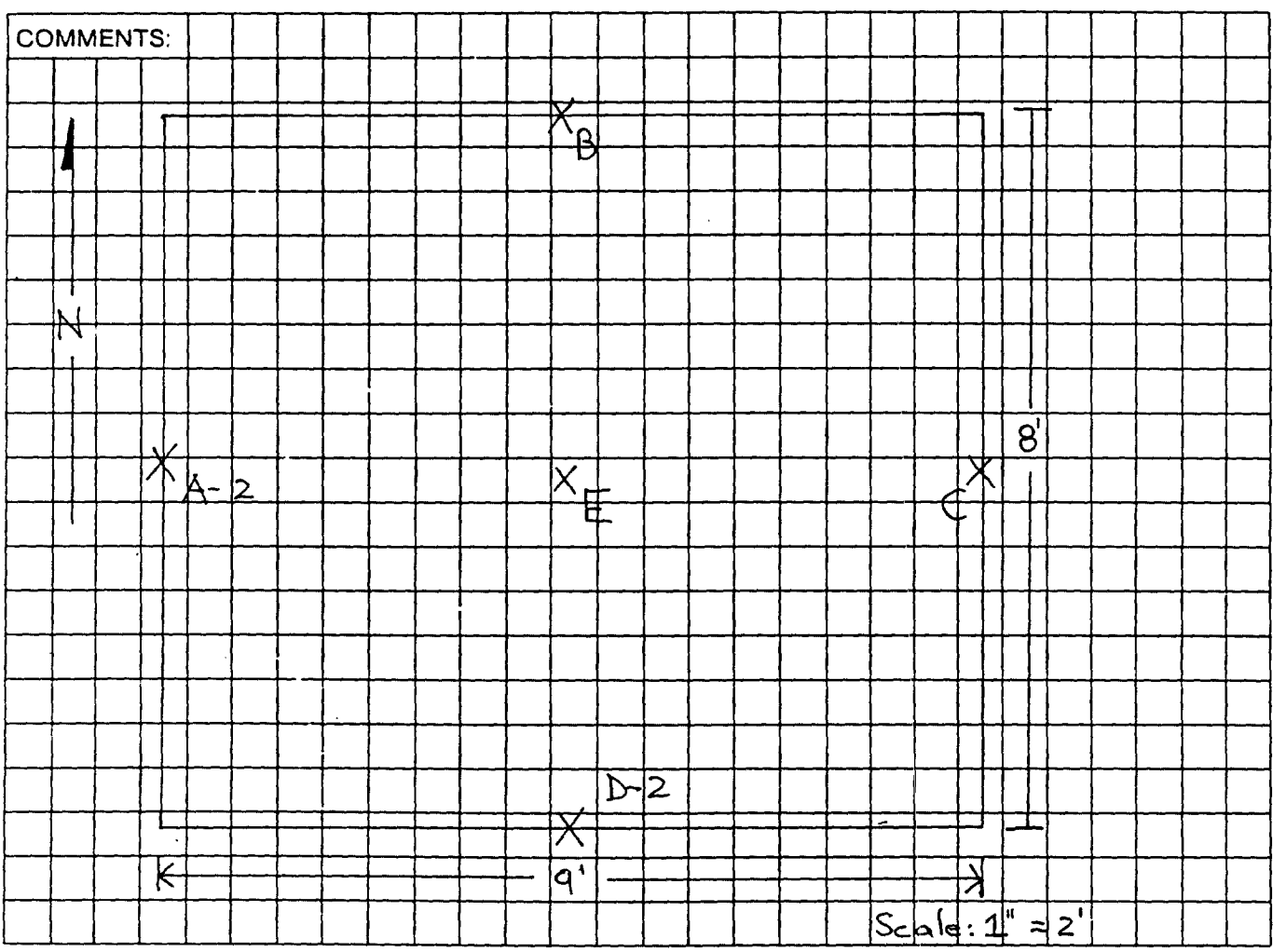
COMPOSITE TYPE

DEPTH OF SAMPLE 1.5 to 2.0 feet (A-2, B, C, D-2) 2.0 to 2.5 feet (E)

WEATHER

CONTAINERS USED	AMOUNT COLLECTED
8 oz. glass	8 oz.

COMMENTS:



PREPARED BY: Paul Dimakos

849530084

COMMENTS:
(Continued)

DATE	
TIME	
PAGE ____ OF ____	
PAGE	
PROJECT NO.	

PREPARED BY: _____

LEGEND

1. A SAMPLE COLLECTION LOG IS TO BE COMPLETED FOR EACH SAMPLE.
2. ALWAYS COMPLETE BOTH SIDES. IF SECOND SIDE IS NOT USED, DRAW A LINE THROUGH IT AND MARK N/A. FILL IN CONTROL BLOCK AND PREPARED BY.
3. ALL ENTRIES ON LOG ARE TO BE COMPLETED, IF NOT APPLICABLE MARK N/A.
4. DATE: USE MONTH/DAY/YEAR; I.E., 10/30/85
5. TIME: USE 24-HOUR CLOCK: I.E., 1835 FOR 6:35 P.M.
6. PAGE: EACH SAMPLE TEAM SHOULD NUMBER PAGE _____ OF _____ FOR THE DAY'S ACTIVITIES FOR ALL SHEETS PREPARED ON A SINGLE DAY. I.E., IF THERE ARE A TOTAL OF 24 PAGES (INCLUDING FRONT AND BACK) NUMBER 1 OF 24, 2 OF 24, ETC.
7. SAMPLE LOCATION: USE BORING OR MONITORING WELL NUMBER, GRID LOCATION (TRANSECT), SAMPLING STATION I.D., OR COORDINATE TO PHYSICAL FEATURES WITH DISTANCES. INCLUDE SKETCH IN COMMENT SECTION IF NECESSARY.
8. SAMPLE TYPE: USE THE FOLLOWING - SOIL; WATER (SURFACE OR GROUND); AIR (FILTERS, TUBES, AMBIENT, PERSONNEL); SLUDGE; DRUM CONTENTS; OIL; VEGETATION; WIPE; SEDIMENT.
9. COMPOSITE TYPE: I.E., 24-HOUR, LIST SAMPLE NUMBERS IN COMPOSITE, SPATIAL COMPOSITE.
10. DEPTH OF SAMPLE: GIVE UNITS, WRITE OUT UNITS SUCH AS INCHES, FEET. DON'T USE ' OR ".
11. WEATHER: APPROXIMATE TEMPERATURE, SUN AND MOISTURE CONDITIONS.
12. CONTAINERS USED: LIST EACH CONTAINER TYPE AS NUMBER, VOLUME, MATERIAL (E.G., 2 - 1L GLASS; 4 - 40 ML GLASS VIAL; 1 - 400 ML PLASTIC; 1 - 3 INCH STEEL TUBE; 1 - 8 OZ. GLASS JAR)
13. AMOUNT COLLECTED: VOLUME IN CONTAINERS (E.G. 1/2 FULL).

849530085

125-10-85

8/5/93
8/24/93 and

INTERNATIONAL TECHNOLOGY CORPORATION

DATE	0	9	0	8	9	3
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PAGE						
PROJECT NO. 529342						

SAMPLE COLLECTION LOG

PROJECT NAME Praxair - Newark

SAMPLE NO. LP - 27 A, B-2, C-2, D and E

SAMPLE LOCATION LP - 27

SAMPLE TYPE Soil - Grab

COMPOSITE ____ YES x NO

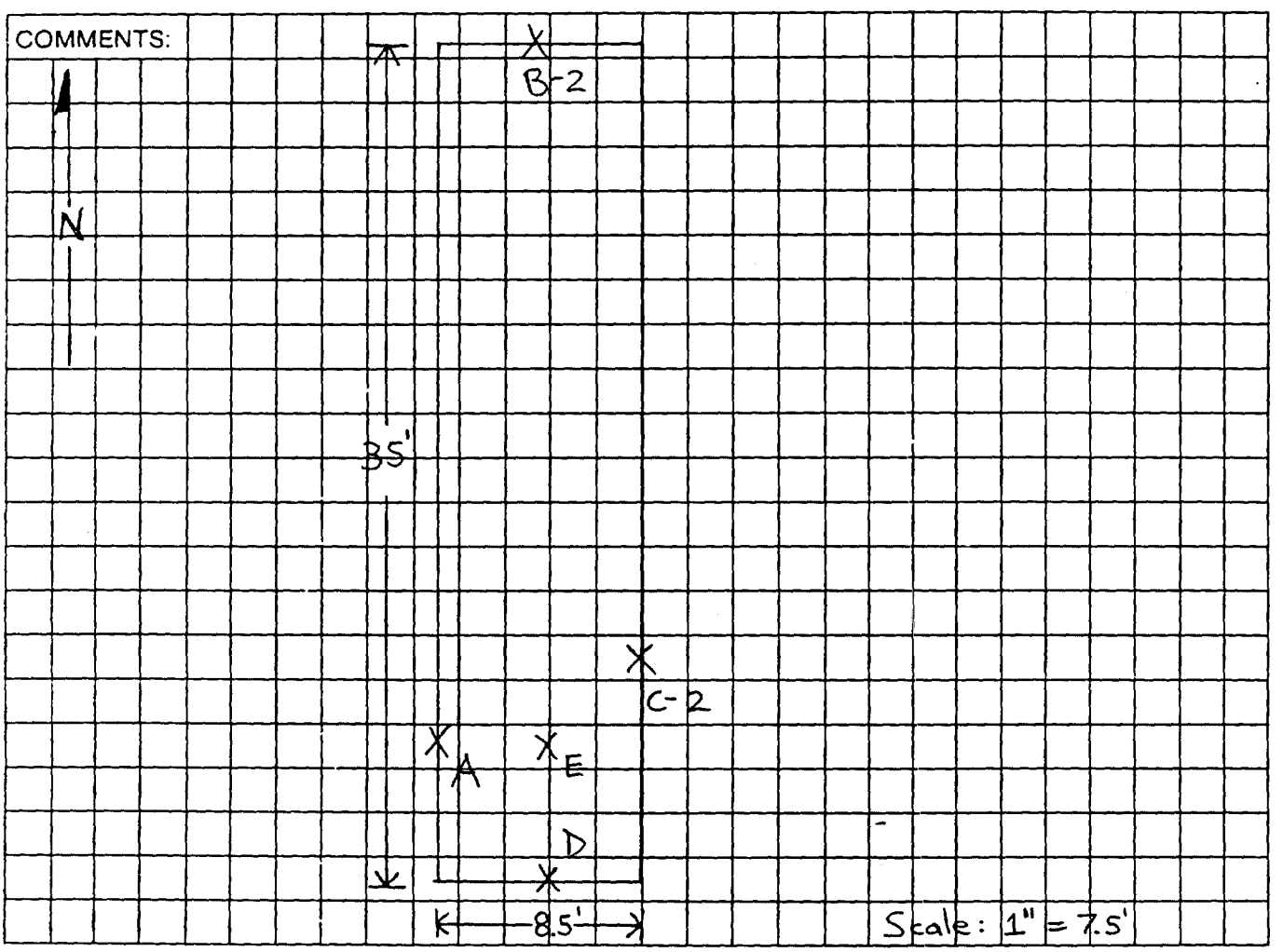
COMPOSITE TYPE 1.5 to 2.0 feet (A, B-2, C-2, D)

DEPTH OF SAMPLE 2.0 to 2.5 feet (E)

WEATHER ____

CONTAINERS USED	AMOUNT COLLECTED
8 oz. glass	8 oz.

COMMENTS:



PREPARED BY: Paul Dimakos

849530086

COMMENTS: (Continued)

DATE	
TIME	
PAGE ____ OF ____	
PAGE	
PROJECT NO.	

PREPARED BY: _____

LEGEND

1. A SAMPLE COLLECTION LOG IS TO BE COMPLETED FOR EACH SAMPLE.
2. ALWAYS COMPLETE BOTH SIDES. IF SECOND SIDE IS NOT USED, DRAW A LINE THROUGH IT AND MARK N/A. FILL IN CONTROL BLOCK AND PREPARED BY.
3. ALL ENTRIES ON LOG ARE TO BE COMPLETED, IF NOT APPLICABLE MARK N/A.
4. DATE: USE MONTH/DAY/YEAR; I.E., 10/30/85
5. TIME: USE 24-HOUR CLOCK: I.E., 1835 FOR 6:35 P.M.
6. PAGE: EACH SAMPLE TEAM SHOULD NUMBER PAGE _____ OF _____ FOR THE DAY'S ACTIVITIES FOR ALL SHEETS PREPARED ON A SINGLE DAY. I.E., IF THERE ARE A TOTAL OF 24 PAGES (INCLUDING FRONT AND BACK) NUMBER 1 OF 24, 2 OF 24, ETC.
7. SAMPLE LOCATION: USE BORING OR MONITORING WELL NUMBER, GRID LOCATION (TRANSECT), SAMPLING STATION I.D., OR COORDINATE TO PHYSICAL FEATURES WITH DISTANCES. INCLUDE SKETCH IN COMMENT SECTION IF NECESSARY.
8. SAMPLE TYPE: USE THE FOLLOWING - SOIL; WATER (SURFACE OR GROUND); AIR (FILTERS, TUBES, AMBIENT, PERSONNEL); SLUDGE; DRUM CONTENTS; OIL; VEGETATION; WIPE; SEDIMENT.
9. COMPOSITE TYPE: I.E., 24-HOUR, LIST SAMPLE NUMBERS IN COMPOSITE, SPATIAL COMPOSITE.
10. DEPTH OF SAMPLE: GIVE UNITS. WRITE OUT UNITS SUCH AS INCHES, FEET. DON'T USE ' OR ".
11. WEATHER: APPROXIMATE TEMPERATURE, SUN AND MOISTURE CONDITIONS.
12. CONTAINERS USED: LIST EACH CONTAINER TYPE AS NUMBER, VOLUME, MATERIAL (E.G., 2 - IL GLASS; 4 - 40 ML GLASS VIAL; 1 - 400 ML PLASTIC; 1 - 3 INCH STEEL TUBE; 1 - 8 OZ. GLASS JAR).
13. AMOUNT COLLECTED: VOLUME IN CONTAINERS (E.G. 1/2 FULL).

INTERNATIONAL TECHNOLOGY CORPORATION

DATE	8/14/93 and 09089 3
TIME	
PAGE	1 OF 1
PAGE	
PROJECT NO.	529342

SAMPLE COLLECTION LOG

PROJECT NAME Praxair - Newark

SAMPLE NO. LP - 30 A-2, B, C, D and E-2

SAMPLE LOCATION LP - 30

SAMPLE TYPE Soil - Grab

COMPOSITE ____ YES x NO

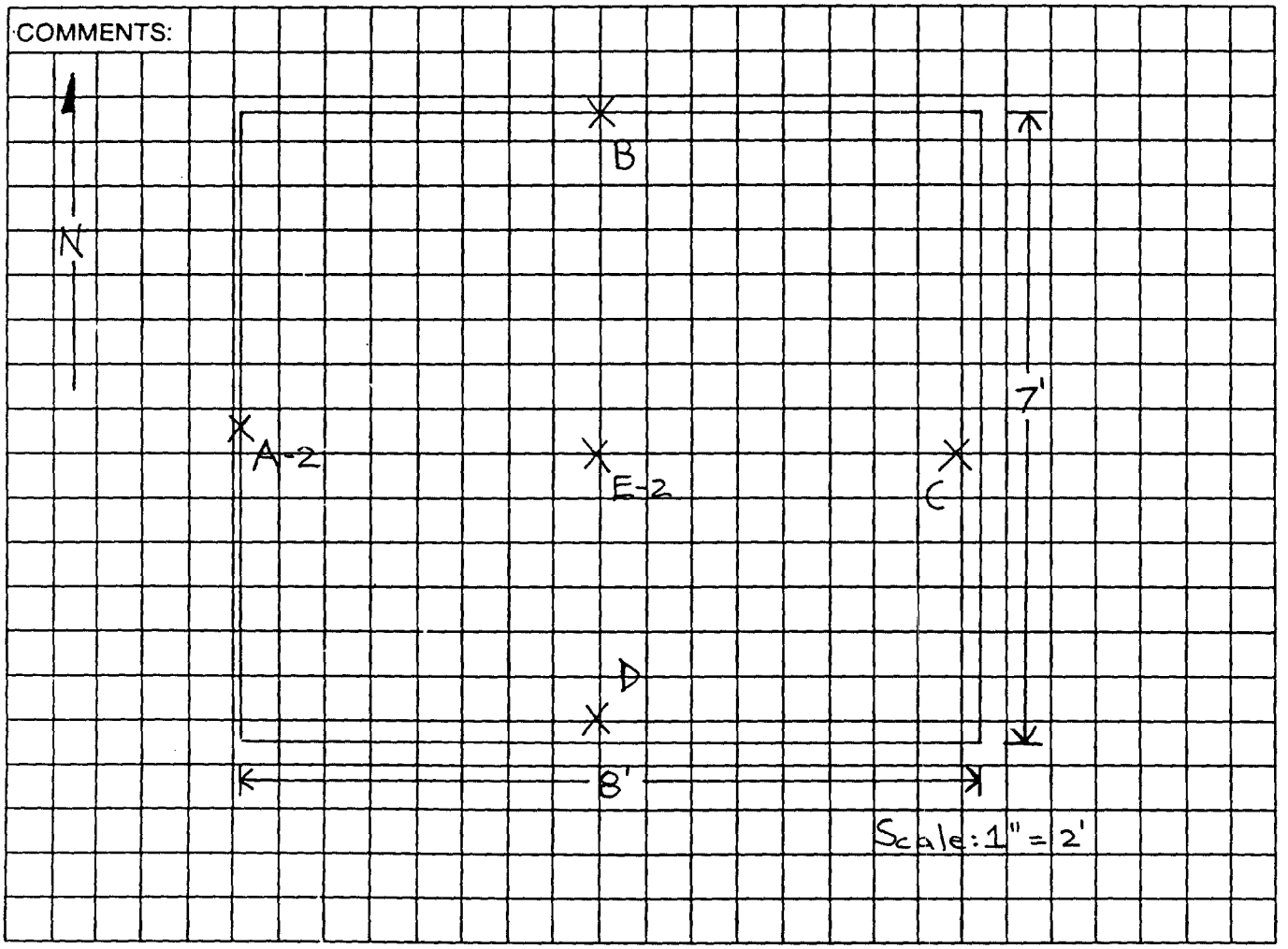
COMPOSITE TYPE 1.5 to 2.0 feet (B,C,D)

DEPTH OF SAMPLE 2.5 to 3.0 feet (A-2)
3.0 to 3.5 feet (E-2)

WEATHER ____

CONTAINERS USED	AMOUNT COLLECTED
8 oz. glass	8 oz.

COMMENTS:



PREPARED BY: Paul Dimakos

849530088

COMMENTS: (Continued)

DATE	
TIME	
PAGE ____ OF ____	
PAGE	
PROJECT NO.	

PREPARED BY: _____

LEGEND

1. A SAMPLE COLLECTION LOG IS TO BE COMPLETED FOR EACH SAMPLE.
2. ALWAYS COMPLETE BOTH SIDES. IF SECOND SIDE IS NOT USED, DRAW A LINE THROUGH IT AND MARK N/A. FILL IN CONTROL BLOCK AND PREPARED BY.
3. ALL ENTRIES ON LOG ARE TO BE COMPLETED. IF NOT APPLICABLE MARK N/A.
4. DATE: USE MONTH/DAY/YEAR; I.E., 10/30/85
5. TIME: USE 24-HOUR CLOCK; I.E., 1835 FOR 6:35 P.M.
6. PAGE: EACH SAMPLE TEAM SHOULD NUMBER PAGE _____ OF _____ FOR THE DAY'S ACTIVITIES FOR ALL SHEETS PREPARED ON A SINGLE DAY. I.E., IF THERE ARE A TOTAL OF 24 PAGES (INCLUDING FRONT AND BACK) NUMBER 1 OF 24, 2 OF 24, ETC.
7. SAMPLE LOCATION: USE BORING OR MONITORING WELL NUMBER, GRID LOCATION (TRANSECT), SAMPLING STATION I.D., OR COORDINATE TO PHYSICAL FEATURES WITH DISTANCES. INCLUDE SKETCH IN COMMENT SECTION IF NECESSARY.
8. SAMPLE TYPE: USE THE FOLLOWING - SOIL; WATER (SURFACE OR GROUND); AIR (FILTERS, TUBES, AMBIENT, PERSONNEL); SLUDGE; DRUM CONTENTS; OIL; VEGETATION; WIPE; SEDIMENT.
9. COMPOSITE TYPE: I.E., 24-HOUR, LIST SAMPLE NUMBERS IN COMPOSITE, SPATIAL COMPOSITE.
10. DEPTH OF SAMPLE. GIVE UNITS. WRITE OUT UNITS SUCH AS INCHES, FEET. DON'T USE ' OR ".
11. WEATHER: APPROXIMATE TEMPERATURE, SUN AND MOISTURE CONDITIONS.
12. CONTAINERS USED: LIST EACH CONTAINER TYPE AS NUMBER, VOLUME, MATERIAL (E.G., 2 - 1L GLASS; 4 - 40 ML GLASS VIAL; 1 - 400 ML PLASTIC 1 - 3 INCH STEEL TUBE; 1 - 8 OZ. GLASS JAR)
13. AMOUNT COLLECTED: VOLUME IN CONTAINERS (E.G. 1/2 FULL).

849530089

125-10-85

APPENDIX D

BaP REFERENCE MATERIAL

Handbook of Toxic and Hazardous Chemicals and Carcinogens

Second Edition

Marshall Sittig

np

Library of Congress Catalog Card Number: 84-22755
ISBN: 0-8155-1009-8
Printed in the United States

Published in the United States of America by
Noyes Publications
Mill Road, Park Ridge, New Jersey 07656

10 9 8 7 6 5 4

Library of Congress Cataloging in Publication Data
Sittig, Marshall.
Handbook of toxic and hazardous chemicals and carcinogens.

Bibliography: p.
Includes index.
1. Poisons--Dictionaries. 2. Hazardous substances--Dictionaries. 3. Carcinogens--Dictionaries. I. Title.
RA1193.S58 1985 615.9'02 84-22755
ISBN 0-8155-1009-8

In April 19
site in Elizabe
toxic waste er
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Toxic waste
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Potential Exposure: Workers in organic synthesis of pharmaceuticals, dyestuffs, rubber chemicals. Used as a solvent and chemical intermediate.

Permissible Exposure Limits in Air: No standards set.

Permissible Concentration in Water: No criteria set. Biological effects reviewed (A-36).

Routes of Entry: Inhalation, ingestion, skin absorption.

Harmful Effects and Symptoms: Toxic when ingested or inhaled.

Personal Protective Methods: Wear long rubber gloves, overalls and apron (A-38).

Respirator Selection: Use self-contained breathing apparatus.

Disposal Method Suggested: (1) Mix with calcium hypochlorite and flush to sewer with water or (2) incinerate.

References

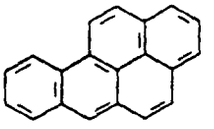
(1) Sax., N.I., Ed., *Dangerous Properties of Industrial Materials Report, 1,* No. 8, 40-42, New York, Van Nostrand Reinhold Co. (1981).
(2) See Reference (A-60).
(3) Sax, N.I., Ed., *Dangerous Properties of Industrial Materials Report, 3,* No. 4, 40-42, New York, Van Nostrand Reinhold Co. (1983).

BENZO[a]PYRENE

See "Polynuclear Aromatic Hydrocarbons" also.

- Carcinogen (EPA-CAG) (IARC) (1)
- Hazardous Waste Constituent (EPA)

Description: $C_{20}H_{12}$ with the structure



forms yellowish crystals melting at 179°C.

Code Numbers: CAS 50-32-8

DOT Designation: —

Synonyms: 3,4-Benzpyrene.

Potential Exposure: Benzo(a)pyrene [B(a)P] is a polycyclic aromatic hydrocarbon (PAH) that has no commercial-scale production.

B(a)P is produced in the United States by one chemical company and distributed by several specialty chemical companies in quantities from 100 mg to 5 g for research purposes.

Although not manufactured in great quantity, B(a)P is a by-product of combustion. It is estimated that 1.8 million pounds per year are released from stationary sources, with 96% coming from: (1) coal refuse piles, outcrops, and

abandoned coal mines; (2) residential external combustion of bituminous coal; (3) coke manufacture; and (4) residential external combustion of anthracite coal.

Human exposure to B(a)P can occur from its presence as a by-product of chemical production. The number of persons exposed is not known. Persons working at airports in tarring operations, refuse incinerator operations, power plants, and coke manufacturers may be exposed to higher B(a)P levels than the general population. Scientists involved in cancer research or in sampling toxic materials may also be occupationally exposed. The general population may be exposed to B(a)P from air pollution, cigarette smoke, and food sources. B(a)P has been detected in cigarette smoke at levels ranging from 0.2 to 12.2 μg per 100 cigarettes. B(a)P has been detected at low levels in foods ranging from 0.1 to 50 ppb.

Permissible Exposure Limits in Air: 0.2 mg/m^3 8-hr TWA (coal tar pitch volatiles) (OSHA). ACGIH (1983/84) designates Benzo(a)pyrene as an industrial substance suspect of carcinogenic potential for man with no TWA value set.

Permissible Concentration in Water: Water quality criteria document for PAH published in final 11/2/80. Total PAH addressed. A concentration of PAH 2.8 ng/ℓ is estimated to limit a cancer risk to one in a million (EPA).

Harmful Effects and Symptoms: B(a)P has produced tumours in all of the nine species for which data are reported following different administrations including oral, skin and intratracheal routes. It has both a local and a systemic carcinogenic effect. In sub-human primates, there is convincing evidence of the ability of B(a)P to produce local sarcomas following repeated subcutaneous injections and lung carcinomas following intratracheal instillation. It is also an initiator of skin carcinogenesis in mice, and it is carcinogenic in single-dose experiments and following prenatal exposure.

In skin carcinogenesis studies in mice, B(a)P was consistently found to produce more tumours in a shorter period of time than did other polycyclic aromatic hydrocarbons, with the possible exception of DB(a,h)A. In a dose-response study involving subcutaneous injection in mice, the minimal dose at which carcinogenicity was detected was higher for B(a)P than for DB(a,h)A and for MC. However, the latent periods were shorter for B(a)P than for DB(a,h)A. In studies using intratracheal administration, B(a)P appeared to be less effective than 7H-dibenzo(c,g)carbazole in the hamster (1).

No epidemiological studies on the significance of B(a)P exposure to man are available, and studies are insufficient to prove that B(a)P is carcinogenic for man. However, coal-tar and other materials which are known to be carcinogenic to man may contain B(a)P. The substance has also been detected in other environmental situations.

References

(1) IARC Monographs on the *Evaluation of Carcinogenic Risk of Chemicals to Man*, vol. 3, IARC, Lyon, France, pp 91-136 (1973).
(2) See Reference (A-62). Also see reference (A-64).
(3) United Nations Environment Programme, *International Register of Potentially Toxic Chemicals*, Geneva, Switzerland (1979).
(4) United Nations Environment Programme, *IRPTC Legal File 1983*, Vol. 1, pp VII/121-22, Geneva, Switzerland, International Register of Potentially Toxic Chemicals (1984).

Sixth Annual Report on

Carcinogens

Summary 1991

U.S. DEPARTMENT OF
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CONTENTS

* For the purpose of this Report, "known carcinogens" are defined as those substances for which the evidence from human studies indicates that there is a causal relationship between exposure to the substance and human cancer.

** For the purpose of this Report, substances "which may reasonably be anticipated to be carcinogens" are defined as those for which there is a limited evidence of carcinogenicity in humans or sufficient evidence of carcinogenicity in experimental animals.

management of these fires can greatly reduce possible human exposure (EPA ORD, 1984). EPA estimated that about 12 million persons within 12 miles of three existing and nine projected commercial incinerators may possibly be exposed to releases of polychlorinated biphenyls in the air. In 1977, NIOSH estimated that 12,000 workers had potential occupational exposure as a result of polychlorinated biphenyls in the work environment (NIOSHb, 1977b).

REGULATIONS

The CPSC received a petition to declare sewage sludge products containing polychlorinated biphenyls hazardous substances. CPSC did not take action based on an anticipated EPA determination on this matter. EPA regulates polychlorinated biphenyls under the Clean Water Act (CWA), Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), Resource Conservation and Recovery Act (RCRA), Superfund Amendments and Reauthorization Act (SARA), and Toxic Substances Control Act (TSCA). EPA has established water quality criteria and a toxic pollutant effluent standard under CWA. These chemicals are subject to reporting requirements under CWA, CERCLA, and SARA. EPA established a statutory reportable quantity (RQ) of 10 lb for polychlorinated biphenyls under CERCLA but lowered the final RQ to 1 lb for these chemicals and specifically for seven commercial mixtures of them. EPA banned the use of these chemicals in pesticides under FIFRA. Certain specific disposal practices of sludges containing polychlorinated biphenyls are prohibited under RCRA. Based upon carcinogenicity, EPA published a Maximum Contaminant Level Goal (MCLG) of zero and a maximum contaminant level (MCL) of 0.0005 mg/l for these chemicals under the Safe Drinking Water Act (SDWA). Under TSCA, EPA banned manufacturing, processing, and distribution of polychlorinated biphenyls and promulgated marketing and disposal rules. EPA has established a polychlorinated biphenyl Spill Cleanup Policy under TSCA. Under the Clean Air Act (CAA), EPA assessed air pollution sources of polychlorinated biphenyls and is considering the need for regulation of emissions from incinerators, the only source for which controls may be essential. FDA regulates polychlorinated biphenyls under the Food, Drug, and Cosmetic Act (FD&CA), establishing tolerances for polychlorinated biphenyls in several foods and in feeds for food-producing animals. The tolerances are 1.5 ppm (fat basis) in milk and manufactured dairy products, 3 ppm (fat basis) in poultry, 0.3 ppm in eggs, 0.2 ppm in finished animal feed, 2 ppm in animal feed components of animal origin, 2 ppm in fish and shellfish (edible portion), and 0.2 ppm in infant and junior foods. FDA established action

levels of 3 ppm (fat basis) in red meat and 10 ppm in paper food-packaging material. NIOSH has recommended a ceiling exposure of 1.0 $\mu g/m^3$ in the workplace. OSHA adopted permissible exposure limits (PELs) of 1 mg/m^3 as an 8-hr time-weighted average (TWA) for chlorodiphenyls containing 42% chlorine and 0.5 mg/m^3 as an 8-hr TWA for chlorodiphenyls containing 54% chlorine. These standards were adopted by OSHA for toxic effects other than cancer. OSHA also regulates polychlorinated biphenyls under the Hazard Communication Standard and as chemical hazards in laboratories.

POLYCYCLIC AROMATIC HYDROCARBONS, 15 LISTINGS

CARCINOGENICITY

There is sufficient evidence for the carcinogenicity of the following polycyclic aromatic hydrocarbons (PAHs) in experimental animals: benz[a]anthracene (56-55-3), benzo[b]fluoranthene (205-99-2), benzo[j]fluoranthene (205-82-3), benzo[k]fluoranthene (207-08-9), benzo[a]pyrene (50-32-8), dibenz[a,h]acridine (226-36-8), dibenz[a,j]acridine (224-42-0), dibenz[a,h]anthracene (53-70-3), 7H-dibenzo[c,g]carbazole (194-59-2), dibenzo[a,e]pyrene (192-65-4), dibenzo[a,h]pyrene (189-64-0), dibenzo[a,i]pyrene (189-55-9), dibenzo[a,l]pyrene (191-30-0), indeno[1,2,3-cd]pyrene (193-39-5), and 5-methylchrysene (3697-24-3) (IARC V.3, 1973; IARC V.32, 1987; IARC S.7, 1987).

When administered by gavage, benz[a]anthracene induced papillomas of the forestomach in mice. In another gavage study, benz[a]anthracene induced lung adenomas and hepatomas in mice. When administered topically, benzo[a]anthracene induced skin papillomas in mice. When administered by a single subcutaneous injection, benz[a]anthracene induced sarcomas in adult mice and pulmonary adenomas and adenocarcinomas in newborn mice. When administered by bladder implantation, benz[a]anthracene induced local carcinomas in mice (IARC V.3, 1973).

When administered topically, benzo[j]fluoranthene induced skin papillomas and carcinomas in female mice. When injected directly into the pulmonary tissues of female rats, benzo[j]fluoroanthene and benzo[k]fluoranthene induced squamous cell carcinomas. When administered topically, benzo[k]fluoranthene was active as an initiator of skin tumors in female mice. When administered by subcutaneous injection, benzo[k]fluoranthene induced local sarcomas in mice of both sexes (IARC V.32, 1983).

When administered by gavage, benzo[a]pyrene induced malignant and benign forestomach tumors in mice and hamsters and mammary tumors in female rats. When administered in the diet, benzo[a]-

pyrene increased the incidence of forestomach tumors and induced lung adenomas in mice. When administered topically, benzo[a]pyrene induced skin carcinomas and papillomas in mice, rats, guinea pigs, and rabbits. When administered by inhalation, benzo[a]pyrene induced tracheal papillomas and carcinomas in hamsters and squamous cell carcinomas of the lung in rats. When administered by intratracheal instillation, benzo[a]pyrene induced lung tumors in rats, tracheobronchial tumors in hamsters, and squamous carcinomas of the lung in two of six subhuman primates. When administered by subcutaneous injection, benzo[a]pyrene induced local sarcomas in rats, hamsters, guinea pigs, newts, subhuman primates, and adult mice; hepatomas and lung adenomas were produced in newborn mice. When administered by intraperitoneal injection, benzo[a]-pyrene induced abdominal fibrosarcomas in mice of both sexes and mammary and uterine carcinomas in rats. When administered by intravenous injection, benzo[a]pyrene induced mammary carcinomas in female rats. When administered by intrabronchial implantation, benzo[a]-pyrene induced local tumors in rats. When administered by subcutaneous or intraperitoneal injections to mice at the 11th, 13th, and 15th day of pregnancy, benzo[a]pyrene increased the incidence of lung adenomas and initiated skin carcinogenesis in the offspring (IARC V.3, 1973).

When administered topically, benzo[b]fluoranthene induced skin tumors in mice (IARC V.3, 1973). When administered by subcutaneous injection, benzo[b]fluoranthene induced local sarcomas in mice. When administered topically, dibenz[a,h]acridine induced skin tumors. When administered by intravenous injection, dibenz[a,h]-acridine increased the incidence of lung tumors in mice (IARC V.3, 1973).

When administered topically, dibenz[a,j]acridine induced skin tumors in mice. When administered by subcutaneous injection, dibenz[a,j]-acridine induced local sarcomas and increased the incidence of lung tumors in mice (IARC V.3, 1973).

When administered in the diet, dibenz[a,h]anthracene induced squamous cell carcinomas and papillomas of the forestomach in mice. When administered as an olive oil emulsion in place of the drinking water, dibenz[a,h]anthracene induced alveologenic carcinomas of the lung and hemangioendotheliomas in mice of both sexes and mammary carcinomas in female mice. When administered by intratracheal injection, dibenz[a,h]anthracene induced lung squamous cell carcinomas in rats. When administered by subcutaneous injection, dibenz[a,h]anthracene induced local sarcomas in rats, guinea pigs, pigeons, fowl, adult mice, and newborn mice; the incidence of lung adenomas was increased in newborn mice. When injected directly into lung tissues, dibenz[a,h]-

anthracene induced lung adenomas. When injected into the kidney of frogs, dibenz[a,h]anthracene induced renal adenocarcinomas. (IARC V.3, 1973).

7H-Dibenzo[c,g]carbazole induced subcutaneous injection site tumors in rats. When administered by gavage, 7H-dibenzo[c,g]carbazole induced forestomach papillomas and carcinomas and benign and malignant hepatomas in mice. When administered by intratracheal injection, 7H-dibenzo[c,g]carbazole induced respiratory tract tumors in hamsters (IARC V.3, 1973).

When administered topically, dibenzo[a,e]pyrene, dibenzo[a,h]-pyrene, dibenzo[a,i] pyrene, and 5-methylchrysene induced skin tumors in mice. Dibenzo[a,h]pyrene also induced skin tumors in rats. These four compounds and dibenzo[a,l]-pyrene induced local sarcomas in mice when administered by subcutaneous injection (IARC V.3, 1973).

An IARC Working Group concluded that there were no adequate data available to evaluate the carcinogenicity of PAHs in humans (IARC V.3, 1973; IARC V.32, 1983). However, there are a number of epidemiologic and mortality studies that show increased incidences of cancer in humans exposed to mixtures of PAHs (ATSDR, 1987b). Mortality studies have demonstrated that exposure to coke oven emissions, which contain a variety of PAHs, caused increased incidences of lung and genitourinary cancer mortality in coke oven workers (see Coke Oven Emissions, p. 791) (IARC V.34, 1984; Lloyd, 1971; Redmond et al., 1972). Workers exposed to creosote containing numerous PAHs developed skin tumors (see Soots, Tars, and Minerals Oils, p. 796). Exposures to other chemical mixtures that contain PAHs, such as cigarette smoke, coal tar, coal tar pitch, and bitumens, have been associated with increased incidences of lung cancer in humans. Dermal exposure to coal tar and shale oils containing PAHs have been associated with increased incidences of skin tumors in humans (IARC V. 35, 1985; 1985; ATSDR, 1987b).

PROPERTIES

The 15 PAHs listed occur as needles, plates, crystals, leaflets, or prisms ranging from colorless to pale yellow to golden yellow. Four of the 15 PAHs, benz[a]anthracene, dibenzo[a,i]pyrene, indeno[1,2,3-cd]pyrene, and 5-methylchrysene, show fluorescence ranging from greenish yellow to brilliant bluish violet to brown. Solubility characteristics vary for each PAH, but in general they are slightly soluble to insoluble in ethanol, and are soluble to slightly soluble in acetic acid, benzene, and acetone. Several PAHs are soluble in toluene, xylene, 1,4-dioxane, and other organic solvents. Some of the PAHs are soluble in mineral and/or olive oil, and dibenz[a,h]anthracene is soluble in cyclohexane. PAHs are insoluble in diethyl ether and petroleum ether, and most are insoluble in water. When heated to

decomposition, benzo[a]pyrene emits acrid smoke, and benzo[j]fluoranthene, benzo[k]fluoranthene, dibenz[a,h]anthracene, and 5-methylchrysene emit acrid smoke and irritating fumes. Dibenz[a,h]acridine, dibenz[a,j]acridine, and 7H-dibenzo[c,g]carbazole emit toxic nitrogen oxide (NOx) fumes when heated to decomposition.

USE

Twelve of the 15 PAHs are used only in biochemical, biomedical, laboratory, and/or cancer research. There are no known uses or applications for the remaining three PAHs, dibenzo[a,h]pyrene, dibenzo-[a,l]pyrene, and 5-methylchrysene (IARC V.32, 1983).

At least 8 of the 15 PAHs are present in coal tar which is used as a fuel in the steel industry in open-hearth and blast furnaces. Coal tar is also used in the clinical treatment of skin disorders such as eczema, dermatitis, and psoriasis. Coal tar is distilled to produce a variety of coal tar products including coal tar pitch and creosote. At least 6 of the 15 PAHs are present in coal tar pitch which is used primarily as a binder for aluminum smelting electrodes in the aluminum reduction process. Coal tar pitch is also used in roofing, surface coatings, for pitch coke production, and a variety of other applications (IARC V.35, 1985). At least 2 of the 15 PAHs are found in creosote which is used to preserve railroad ties, marine pilings, and telephone and telegraph poles. Some creosote is used for fuel by steel producers (NIOSHa, 1977). At least 3 of the 15 PAHs are present in bitumens and asphalt which are used for paving roads, for sound- and water-proofing, and coating pipes.

PRODUCTION

Eight of the 15 PAHs are not produced for commercial use in the United States (IARC V.32, 1983). The remaining seven PAHs, benz[a]-anthracene, benzo[b]-fluoranthene, benzo[k]fluoranthene, benzo[a]py-rene, dibenz[a,h]anthra-cene, di-benzo[a,e]pyrene, and indeno[1,2,3-cd]pyrene, are produced primarily for research purposes. The 1979 TSCA Inventory reported one producer with no stated volumes of benz[a]anthra-cene and dibenz[a,h-]anthracene in 1977 (TSCA, 1979). Indeno[1,2,3-cd]pyrene is listed in the TSCA Inventory, but production and import volumes are not given. Analytical grade indeno[1,2,3-cd]-pyrene is produced by one domestic company for use in laboratory investigations (Chem Sources, 1986). The TSCA Inventory reported one U.S. manuf-acturer of benzo[a]pyrene with a CBI Aggregate production of less than 1 million lb. Several specialty chemical companies distribute benz[a]anthra-cene for research purposes in quantities ranging from 1 to 5 g.Benzo[b]fluoranthene is available from some specialty chemical firms in quantities of 25 to 100 mg. Dibenz-[a,h]anthracene and benzo[a]-pyrene are also available from some specialty chemical companies in quantities of

100-500 mg and 100-1,000 mg, respectively. Benzo[k]fluoranthene is produced in the United States by one company for use as a research chemical (TSCA, 1979; Chem Sources, 1986).

All 15 PAHs form as a result of incomplete combustion of organic compounds. The primary source of PAHs in air is the incomplete combustion of wood and fuel for residential heating. The PAHs are found in gasoline or diesel motor vehicle exhaust, by-products of open fires or refuse burning, coal tar, coal tar pitch, coke tars or coke oven emissions, creosote, mineral oils, bitumens, industrial smoke and soot, cigarette and cigar tobacco and smoke, tar, or smoke condensates, and charcoal-broiled foods. Benzo[a]anthracene is found in gasoline and diesel exhaust, cigarette smoke and smoke condensate, amino acid, fatty acid, and carbohydrate pyrolysis products, coal tar and coal tar pitch, asphalt, soot and smoke, wood smoke, coal combustion emissions, commercial solvents, waxes, mineral oil, and creosote. Benzo[b]fluoranthene is found in gasoline exhaust, tobacco leaves, cigarette smoke, carbohydrates, amino acid and fatty acid pyrolysis products, coal tar, and soot. Benzo[j]fluoranthene is found in cigarette smoke, gasoline exhaust, coal smoke, oil heat emissions, used motor oils, crude oils, and coal tar. Benzo[k]fluoranthene is found in cigarette smoke, gasoline exhaust, coal and oil combustion emissions, coal tar, lubricating oils, used motor oils, and crude oils. Benzo[a]pyrene is found in gasoline and diesel exhaust, cigarette smoke and smoke conden-sate, pyrolysis products of carbohy-drates, amino acids, and fatty acids, coal tar and coal tar pitch, soot and smoke, petroleum asphalt, creosote oil, shale oil, and commercial solvents. Dibenz[a,h]acridine is found in cigarette smoke condensate, coal combustion emissions, petroleum refinery incinerator emissions, and coal tar pitch. Dibenz[a,j]acridine is found in gasoline exhaust, cigarettes and cigarette smoke condensates, coal combustion stack effluents, petroleum refinery incinerator effluents, and coal tar pitch. Dibenz[a,h]anthracene is found in gasoline exhaust, cigarette smoke condensate, soot, and coal tar. 7H-Dibenzo[c,g]carbazole is found in cigarette tar. Dibenzo[a,e]pyrene is found in fossil fuels, tobacco smoke, and gasoline exhaust. Dibenzo[a,h]-pyrene may be found in engine exhaust, cigarette tar, and coal tar pitch. Dibenzo[a,i]pyrene may be found in automobile exhaust, cigarette smoke, and coal tar. Dibenzo[a,l]-pyrene is found in fossil fuels, cigarette smoke, and coal gasification products. Indeno[1,2,3-cd]pyrene is found in automobile and diesel exhaust, cigarette smoke condensate, benzene and pyrene pyrolysis products, soot, coal tar and coal tar pitch, and petroleum asphalt. 5-Methylchrysene is found in gasoline exhaust and tobacco smoke. Other sources of incidentally generated

PAHs include coal and coal combustion, petroleum refinery incinerators, forest fires, incomplete combustion of diesel and kerosene, soot, and marijuana smoke, volcanoes, shale oil, and crude oil (IARC V.32, 1983; Kirk-Othmer V.11, 1980; ATSDR, 1989).

Production data for tar, tar pitch, creosote, mineral oils, and coke which contain various PAHs are included in their respective profiles in this Annual Report (see Coke Oven Emissions, p. 791, and Soots, Tars, and Mineral Oils, p. 796).

EXPOSURE

The primary routes of potential human exposure to PAHs are inhalation of polluted air, wood smoke, and tobacco smoke, as well as ingestion of contaminated water, foodstuffs, and foods normally containing microgram quantities of PAHs. Foods found to contain minute quantities of benz[a]anthracene, benzo[j]fluoranthene, benzo[a]pyrene, dibenz[a,h]anthracene, or indeno-[1,2,3-cd]pyrene include: smoked, barbecued, or charcoal-broiled foods, vegetables and vegetable oils, margarines, roast coffee and coffee powders, fresh sausages, cereals, grains, flour, breads, meats, seafood, fruits, processed foods, and beverages. Potential human exposure may also occur through ingestion of drinking water, surface water, rain water, sewage water, subterranean water, and sea water contaminated by certain PAHs (IARC V.32, 1983). PAHs have been detected at low levels in some drinking water supplies as well as in fresh and sea water in the United States (IARC V.34, 1984). Inhalation of dust, soot, or vehicle exhaust contaminated by PAHs is another route of possible exposure. Potential human exposure to PAHs may also occur by dermal contact with PAH-containing products such as creosote-treated wood products, asphalt roads, or coal tar. Consumers may be exposed to PAHs that are present in dermatological preparations containing coal tar (IARC V.35, 1985). PAHs do not usually enter the body through the skin under normal conditions; however, small amounts could enter the body if there is contact with products or oils containing high concentrations of PAHs.

Benzo[a]pyrene occurs as a product of combustion, with stationary sources releasing an estimated 1.8 million lb per year. The sources for 96% of the benzo[a]pyrene released are coal refuse piles, outcrops, abandoned coal mines, coke manufacture, and residential external combustion of bituminous and anthracite coals (Kirk-Othmer V.11, 1980). The monitoring of several air pollution sources of dibenz[a,h]acridine showed concentrations of 17 mg/1,000 m^3 in coal combustion stack effluents, 0.01 mg/1,000 m^3 in air polluted by coal tar pitch, < 0.12-0.7 mg/1,000 m^3 in petroleum refinery incinerator effluents, and 0.01 µg/100 cigarettes smoked in cigarette smoke condensate (IARC V.3, 1973). Dibenz[a,j]acridine has been detected in concentrations of 2 mg/1,000 m^3 in

coal combustion stack effluents, 0.15-1.8 mg/1,000 m^3 in petroleum refinery incinerator effluents, 0.001 mg/1,000 m^3 in air polluted by coal tar pitch, up to 300 µg/kg in automobile exhaust, and 0.27 µg/100 cigarettes smoked. Benzo[b]fluoranthene has been detected in a fixed bed gasifier of a coal gasification plant at a concentration of 140 µg/g. It has also been found in cigarette smoke at 4-22 mg/cigarette smoked. Benz[a]anthracene and dibenz[a,h]anthracene have been detected in cigarette smoke at concentrations of 20-70 mg/cigarette smoked and 4 mg/cigarette smoked, respectively (IARC V.32, 1983). 7H-Dibenzo[c,g]carbazole is found in cigarette tar in concentrations of 0.07 µg/100 cigarettes smoked (IARC V.3, 1973).

There is potential occupational exposure to PAHs for workers at coal tar production plants, coking plants, coal gasification sites, smoke houses, foundries, aluminum production plants, bitumen and asphalt production plants, road and roof tarring operations, municipal incineration sites, other facilities that burn carbonaceous materials, and in kitchens where high-temperature fryers and broilers are used (ATSDR, 1987b). The National Occupational Exposure Survey (1981-1983) estimated that 28 workers potentially were exposed to benz[a]anthracene through actual use of the compound; 896 total workers, including 299 females, potentially were exposed to benzo[a]pyrene through actual use of the compound (NIOSH, 1984). The National Occupational Hazard Survey, conducted by NIOSH from 1972 to 1974, estimated that about 210,000 workers were potentially exposed to dibenzo[a,h]pyrene, dibenzo[a,i]-pyrene, and indeno[1,2,3-cd]pyrene from inhalation of asphalt volatiles, coal tar pitch volatiles, and coke oven emissions. An unspecified additional number of workers may possibly have been exposed to PAHs by combustion products from fuel oil, diesel fuel, kerosene, and wood (NIOSH, 1976).

The U.S. Department of Agriculture estimated that about 100 commercial thermal and dip-treatment workers have consistently high potential inhalation exposure to creosote, which contains benz[a]anthracene, benzo[a]pyrene, and dibenz[a,h]-anthracene. About 4,000 commercial pressure-treatment workers were estimated to have occasional high potential inhalation exposure to creosote. Skin contact with creosote was classified as minimal, except among maintenance workers, who were estimated to have occasional high potential exposure (IARC V.35, 1985). The National Occupational Hazard Survey estimated that 2 million workers were potentially exposed to bitumens and 33,000 were potentially exposed to bitumen fumes in the workplace. The majority of the workers potentially exposed to bitumens are employed in highway and street construction, roofing and sheet-metal operations, and steel mills (NIOSH, 1976).

REGULATIONS

The Carcinogen Assessment Group at EPA has designated most of the PAHs as potential carcinogens. As a result, EPA regulates the PAHs under the hazardous waste disposal rule of the Resource Conservation and Recovery Act (RCRA). The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) has established reportable quantities (RQs) for most of the PAHs. Water quality criteria set by the Clean Water Act (CWA) also address all PAHs. EPA has included some PAHs on a list of priority hazardous chemicals subject to reporting requirements under the Superfund Amendments and Reauthorization Act (SARA). There have been few attempts to develop occupational exposure standards for specific PAHs. However, for coal tar products, NIOSH recommended a workplace standard of 0.1 mg/m^3 as a 10-hr time-weighted average (TWA). OSHA indirectly limits exposure to PAHs by requiring that occupational exposure to coal tar pitch volatiles not exceed 0.2 mg/m^3 as an 8-hr TWA. In another attempt to minimize the risk of workplace exposure to PAHs, OSHA promulgated a permissible exposure limit (PEL) of < 0.15 mg/m^3 as an 8-hr TWA for coke oven emissions. OSHA also regulates PAHs under the Hazard Communication Standard and as chemical hazards in laboratories.

PROCARBAZINE HYDROCHLORIDE
CAS No. 366-70-1

CARCINOGENICITY

There is sufficient evidence for the carcinogenicity of procarbazine hydrochloride in experimental animals (NCI 19, 1979; IARC V.26, 1981; IARC S.4, 1982; IARC S.7, 1987). The generic name procarbazine is used interchangeably with procarbazine hydrochloride in the literature, and since only procarbazine hydrochloride is produced, it was assumed to be procarbazine hydrochloride under study. When administered by repeated intraperitoneal injection, procarbazine hydrochloride induced olfactory neuroblastomas, adenocarcinomas of the mammary gland, and malignant lymphomas, lymphocytic type, in rats of both sexes, and olfactory neuroblastomas in mice of both sexes and uterine adenocarcinomas in female mice. When administered by gavage, the compound induced leukemia and benign tumors of the lung in mice of both sexes and adenocarcinomas or carcinomas of the mammary gland in female rats but not in male rats. When administered by repeated intravenous injections, the compound induced three renal sarcomas and two intra-abdominal spindle cell sarcomas in male rats. Male and female monkeys, including Rhesus, cynomolgus and African green monkeys, were given procarbazine hydrochloride by subcutaneous, intervenous, and oral routes. Rhesus monkeys developed acute myelogenous leukemia. Cynomolgus monkeys had leukemia or lymphoma, and multiple hemangiosarcomas. The rarity of neoplasms, and in particular leukemias (none in control monkeys in that colony), strongly suggests that procarbazine induced the tumors.

An IARC Working Group reported that there were no adequate data available to evaluate the carcinogenicity of procarbazine hydrochloride in humans as no epidemiologic study of procarbazine as a single agent was available. In various combinations with other chemotherapeutic agents given for Hodgkin's disease, procarbazine use has repeatedly been shown to lead to the appearance of acute nonlymphocytic leukemia. These combinations usually also include nitrogen mustard, an alkylating agent which is also a potent animal carcinogen, and these many obervations do not permit conclusions about the independent effect of either drug.

PROPERTIES

Procarbazine hydrochloride is a white-to-pale yellow crystalline powder with a slight odor. It is soluble but unstable in water and aqueous solutions. When heated to decomposition, it emits very toxic fumes of nitrogen oxides (NOx). It is available in the United States as a USP grade containing 98.5%-100.5% active ingredient.

USE

Procarbazine hydrochloride is used in human medicine as an antineoplastic agent. It is used in combination with other antineoplastic agents to treat Hodgkin's disease and is also used to treat malignant melanoma, non-Hodgkin's lymphoma, and small-cell carcinomas of the lung (IARC V.26, 1981). FDA approved its use in 1969, indicating that the drug should be used as an adjunct to standard therapy.

PRODUCTION

The USITC identified two U.S. producers of procarbazine hydrochloride in 1988, but no production data were reported (USITC, 1989). The USITC reported that two U.S. companies produced an unknown quantity of procarbazine hydrochloride in 1986 (USITC, 1987). No other production, import, or export data were available. The 1979 TSCA Inventory reported no production data for procarbazine or its hydrochloride (TSCA, 1979).

EXPOSURE

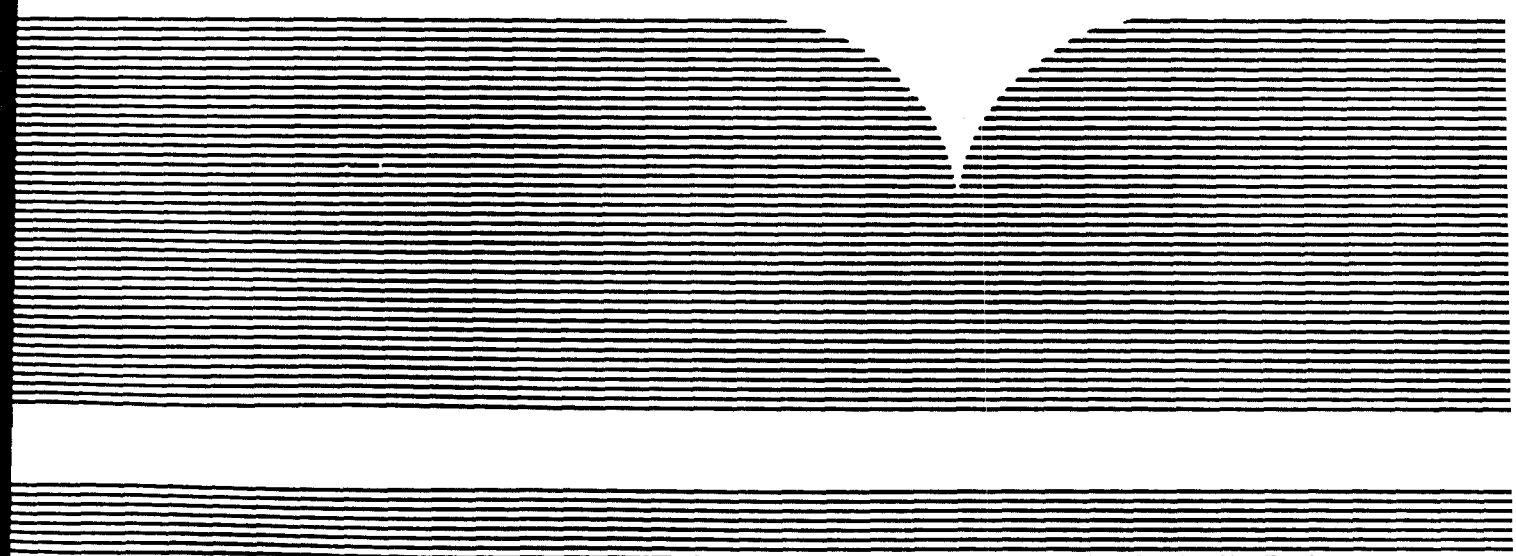
The primary routes of potential human exposure to procarbazine hydrochloride are ingestion, inhalation, and dermal contact. For patients receiving the drug, the usual initial dose of procarbazine hydrochloride is 2-4 mg/kg body weight daily given orally in divided doses for 1 week, then 4-6 mg/kg body weight daily, until signs of bone marrow depression occur. After bone marrow recovery, treatment is resumed at a

PB90-258245

TOXICOLOGICAL PROFILE FOR BENZO(A)PYRENE

Agency for Toxic Substances and Disease Registry, Atlanta, GA

May 90



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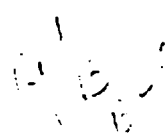

5. MANUFACTURE, IMPORT, USE, AND DISPOSAL

5.1 OVERVIEW

B[a]P is on the Toxic Substances Control Act (TSCA) Chemical Inventory (EPA 1979b), which lists chemicals (as defined by TSCA) that have been manufactured, imported, or processed for a commercial purpose in the United States since January 1, 1975. Data from the TSCA inventory indicates that the aggregate production of B[a]P is <1 million lb. B[a]P also occurs in fossil fuels and as a result of the incomplete combustion of fuel and wood. B[a]P is available as a research chemical from some specialty chemical firms. B[a]P and other polycyclic aromatic hydrocarbons are found in coal tar and in the creosote oils and pitches formed from the distillation of coal tars. Coal tar pitch is primarily used as a binder for electrodes. Creosote is primarily used as a wood preservative. Coal tar is also used as a therapeutical treatment for skin diseases (e.g., psoriasis). PAHs are also found in limited amounts in bitumens and asphalt.

5.2 PRODUCTION

The primary current source of B[a]P in air is combustion of wood for residential heating (EPA 1985). The production of B[a]P from this source is a consequence of incomplete combustion and uncontrolled release into the air. As a product of combustion, an estimated 1.8 million lb of B[a]P is released from stationary sources. The sources for 96% of this amount are refuse piles, outcrops, abandoned coal mines, coke manufacture, and residential external combustion of bituminous and anthracite coal.

Crude coal tar is produced as a by-product in the formation of coke from coal. Hot gases and vapors that are released from the conversion of coal to coke are collected in a scrubber that condenses these gases into ammonia, water, crude tar, and other by-products. A typical coke oven produces 80% coke, 12% coke-oven gas, 3% coal tar, and 1% crude benzene. The coal tar is then distilled to yield a number of chemical oils, creosote, and coal tar pitch. The coal tar pitch residue is 40.5% of the crude tar; creosote is ~11.5%. Heavy and light creosote also make up a small percentage of distillate (NIOSH 1977). Coal tar contains ~30 mg/kg B[a]P; coal tar pitch contains ~10 mg/kg B[a]P; and creosote oil contains <0.01 mg/kg B[a]P (EPA 1985).

As of 1981, the world output of crude coal tar was 1.8×10^7 metric tons; 1.4×10^7 metric tons was of coke-oven origin. In 1980, the U.S. production of crude tar was 2.4×10^6 metric tons. Creosote oil production in the United States in 1981 was estimated to be 5.1×10^5 metric tons. The coal tar pitch production in the United States in 1974 was estimated to be 1×10^6 metric tons (McNeil 1983).

Bitumens and asphalt are derived from crude oils. Asphalt is a mixture of bitumen with mineral materials (IARC 1985). Bitumen samples have been reported to contain between 0.1 and 27 mg/kg B[a]P (IARC 1985).

5.3 IMPORT

In 1985, the United States imported a total of almost 12 million gal of creosote oil from the Netherlands, France, West Germany, and other countries and almost 185 million lb of coal tar pitch, blast furnace tar, and oil-gas tar from Canada, Mexico, West Germany, Asian countries, Australia, and other countries (USDOC 1986).

5.4 USE

B[a]P has some use as a research chemical. It is available from some specialty chemical firms in quantities of 100 mg to 1 g (Aldrich Chemical Co. 1986).

Coal tar pitch is removed from the tar still as a residue. The rate of feeding and firing of the still regulates the viscosity of the tar. Coal tar pitch is primarily used as a binder for electrodes in the aluminum reduction process; it is used to bind the carbon electrodes used in the reduction pots (NIOSH 1977). In North America, coal tar pitch is also used as the adhesive in membrane roofs (McNeil 1983).

Almost 99% of creosote produced is sold to wood preservation plants; from 0.1 to 0.2% is sold to individual customers (NIOSH 1977). Creosote is used in the preservation of railroad ties, marine pilings, and telephone and telegraph poles. Some creosote is also consumed as fuel by steel producers (NIOSH 1977).

Coal tar is also used in the clinical treatment of skin disorders (e.g., eczema, dermatitis, and psoriasis). The use of dermatological coal tar preparations is extensive (NIOSH 1977).

Bitumens and asphalt are primarily used for paving roads, waterproofing and roofing, electrical insulation, sound insulation, and pipe coating (IARC 1985).

5.5 DISPOSAL

Following small input of B[a]P from coal-tar creosote, 0.36 mg/L B[a]P has been found in water raw discharge from timber product industries in 1978 (EPA 1985).

Total B[a]P wastewater discharge in 1978 from coke-making operations was reported as 3 metric tons (EPA 1985).

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ATTACHMENT 14 d)

PAGE

State of Delaware

Office of Secretary of State

I, MICHAEL RATCHFORD, SECRETARY OF STATE OF THE STATE OF DELAWARE, DO HEREBY CERTIFY THE ATTACHED IS A TRUE AND CORRECT COPY OF THE CERTIFICATE OF RESTATED CERTIFICATE OF INCORPORATION OF "UNION CARBIDE INDUSTRIAL GASES INC." FILED IN THIS OFFICE ON THE FIFTH DAY OF JUNE, A.D. 1992, AT 10 O'CLOCK A.M.

* * * * * * * * * *

92 JUN 12 A 10:51.0

DEPARTMENT OF STATE
OFFICE OF THE SECRETARY OF STATE
1776 1793 1970
DELAWARE

Michael Ratchford, Secretary of State

AUTHENTICATION: *3474791

DATE: 06/05/1992

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STATE OF DELAWARE
SECRETARY OF STATE
DIVISION OF CORPORATIONS
FILED 10:00 AM 06/05/1992
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RESTATED
CERTIFICATE OF INCORPORATION
of

UNION CARBIDE INDUSTRIAL GASES INC.

The undersigned certify that they are the Vice President and the Assistant Secretary, respectively, of Union Carbide Industrial Gases Inc. a corporation organized and existing under the laws of the State of Delaware (the "Corporation"), and do hereby certify as follows:

The date of filing of the original Certificate of Incorporation of the Corporation with the Secretary of State of the State of Delaware was October 26, 1988. The original name of the Corporation was "Union Carbide Industrial Gases Inc."

This Restated Certificate of Incorporation has been duly adopted in accordance with the applicable provisions of Sections 228, 242 and 245 of the General Corporation Law of the State of Delaware.

The text of the Certificate of Incorporation of the Corporation, as amended and restated, shall read in its entirety as follows:

ARTICLE I

NAME

The name of the Corporation is Praxair, Inc.

ARTICLE II

REGISTERED OFFICE

The address of its registered office in the State of Delaware is 1209 Orange Street, in the City of Wilmington, County of New Castle. The name of the registered agent at such address is The Corporation Trust Company.

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ARTICLE III

PURPOSE; DURATION

The nature of the business or purposes to be conducted or promoted by the Corporation is to conduct any lawful business, to exercise any lawful purpose and power and to engage in any lawful act or activity for which corporations may be organized under the General Corporation Law of the State of Delaware, as the same may be amended from time to time. The Corporation is to have perpetual existence.

ARTICLE IV

CAPITALIZATION

The total number of shares of stock which the Corporation shall have authority to issue is 525,000,000 shares, with a par value of $.01 each, amounting in the aggregate to $5,250,000. Said shares shall consist of 25,000,000 shares of preferred stock and 500,000,000 shares of common stock.

A. Preferred Stock

1. The preferred stock of the Corporation may be issued from time to time in one or more series of any number of shares, provided that the aggregate number of shares issued and not cancelled in any and all such series shall not exceed the total number of shares of preferred stock hereinabove authorized.

2. Authority is hereby vested in the Board of Directors from time to time to authorize the issuance of one or more series of preferred stock and, in connection with the creation of such series, to fix by resolution or resolutions providing for the issuance of shares thereof the characteristics of each such series including, without limitation, the following:

(a) the maximum number of shares to constitute such series, which may subsequently be increased or decreased (but not below the number of shares of that series then outstanding) by resolution of the Board of Directors, the distinctive designation thereof and the stated value thereof if different than the par value thereof;

(b) whether the shares of such series shall have voting powers, full or limited, or no voting powers, and if any, the terms of such voting powers;

(c) the dividend rate, if any, on the shares of such series, the conditions and dates upon which such dividends shall be payable, the preference or relation which such dividends shall bear to the dividends payable on any other class or classes or on any other series of capital stock and whether such dividend shall be cumulative or non-cumulative;

(d) whether the shares of such series shall be subject to redemption by the Corporation, and, if made subject to redemption, the times, prices and other terms, limitations, restrictions or conditions of such redemption;

(e) the relative amounts, and the relative rights or preference, if any, of payment in respect of shares of such series, which the holders of shares of such series shall be entitled to receive upon the liquidation, dissolution or winding-up of the Corporation;

(f) whether or not the shares of such series shall be subject to the operation of a retirement or sinking fund and, if so, the extent to and manner in which any such retirement or sinking fund shall be applied to the purchase or redemption of the shares of such series for retirement or to other corporate purposes and the terms and provisions relative to the operation thereof;

(g) whether or not the shares of such series shall be convertible into, or exchangeable for, shares of any other class, classes or series, or other securities, whether or not issued by the Corporation, and if so convertible or exchangeable, the price or prices or the rate or rates of conversion or exchange and the method, if any, of adjusting same;

(h) the limitations and restrictions, if any, to be effective while any shares of such series are outstanding upon the payment of dividends or the making of other distributions on, and upon the purchase, redemption or other acquisition by the Corporation of, the Common Stock (as defined below) or any other class or classes of stock of the Corporation ranking junior to the shares of such

series either as to dividends or upon liquidation, dissolution or winding-up;

(i) the conditions or restrictions, if any, upon the creation of indebtedness of the Corporation or upon the issuance of any additional stock (including additional shares of such series or of any other series or of any other class) ranking on a parity with or prior to the shares of such series as to dividends or distribution of assets upon liquidation, dissolution or winding-up; and

(j) any other preference and relative, participating, optional or other special rights, and the qualifications, limitations or restrictions thereof, as shall not be inconsistent with law, this Article IV or any resolution of the Board of Directors pursuant hereto.

B. Common Stock

1. The common stock of the Corporation may be issued from time to time in one or more series of any number of shares, provided that the aggregate number of shares issued and not cancelled in any and all such series shall not exceed the total number of shares of common stock hereinabove authorized. Without limiting the generality of the foregoing, shares of a series of common stock consisting of 300,000,000 shares, or such larger number of shares as the Board of Directors shall from time to time fix by resolution or resolutions, may be issued from time to time by the Board of Directors. Shares of this series shall be designated, and are hereinafter called, "Common Stock." Each share of common stock of the Corporation outstanding as of June 5, 1992, shall be reclassified as one share of this series.

The holders of record of the Common Stock shall be entitled to the following rights:

(a) to vote at all meetings of stockholders of the Corporation, and such holders shall have one vote at all such meetings in respect of each share of Common Stock held of record by them;

(b) subject to the prior rights of the holders of all classes or series of stock at the time outstanding having prior rights as to dividends, to receive when, if and as declared by the Board of Directors out of the assets of the Corporation legally available therefor, such

dividends as may be declared by the Corporation from time to time to holders of Common Stock; and

(c) subject to the prior rights of the holders of all classes or series of stock at the time outstanding having prior rights as to distribution of assets upon liquidation, dissolution or winding-up, to receive the remaining assets of the Corporation upon liquidation, dissolution or winding-up.

2. Authority is hereby vested in the Board of Directors from time to time to authorize the issuance of shares of common stock in one or more additional series, and, in connection with the creation of such series, to fix by resolution or resolutions providing for the issuance of shares thereof the characteristics of each such additional series including, without limitation, the following:

(a) the maximum number of shares to constitute such series, which may subsequently be increased or decreased (but not below the number of shares of that series then outstanding) by resolution of the Board of Directors, and the distinctive designation thereof;

(b) whether the shares of such series shall have voting powers, full or limited, or no voting powers, and if any, the terms of such voting powers;

(c) the dividend rate, if any, on the shares of such series, the conditions and dates upon which such dividends shall be payable and the preference or relation which such dividends shall bear to the dividends payable on any other class or classes or on any other series of capital stock;

(d) whether the shares of such series shall be subject to redemption by the Corporation, and, if made subject to redemption, the times, prices and other terms, limitations, restrictions or conditions of such redemption;

(e) whether or not the shares of such series shall be convertible into, or exchangeable for, shares of any other class, classes or series, or other securities, whether or not issued by the Corporation, and if so convertible or exchangeable, the price or prices or the rate or rates of conversion or exchange and the method, if any, of adjusting same; and

(f) any other rights, and the qualifications, limitations or restrictions thereof, as shall not be inconsistent with law, this Article IV or any resolution of the Board of Directors pursuant hereto.

ARTICLE V

BOARD OF DIRECTORS

A. Number, Tenure and Qualifications of Directors; Removal. 1. The business and affairs of the Corporation shall be managed by or under the direction of a Board of Directors consisting of such number of directors as is determined from time to time by resolution adopted by affirmative vote of a majority of the entire Board of Directors; provided, however, that in no event shall the number of directors be less than three. The directors shall be divided into three classes, designated Class I, Class II and Class III. Each class shall consist, as nearly as may be possible, of one-third (1/3) of the total number of directors constituting the entire Board of Directors. By unanimous written consent of the Board of Directors, the initial classes shall be elected as follows: Class I directors shall be elected for a one-year term, Class II directors for a two-year term and Class III directors for a three-year term. At each succeeding annual meeting of stockholders, successors to the class of directors whose term expires at that annual meeting shall be elected for three-year terms. If the number of directors is changed, any increase or decrease shall be apportioned among the classes so as to maintain the number of directors in each class as nearly equal as possible, and any additional director of any class elected to fill a vacancy resulting from an increase in such class shall hold office for a term that shall coincide with the remaining term of that class, but in no case will a decrease in the number of directors shorten the term of any incumbent director. A director shall hold office until the annual meeting for the year in which his or her term expires and until his or her successor shall be elected and shall qualify, subject, however, to prior death, resignation, retirement, disqualification or removal from office. Except as otherwise required by law, any vacancy on the Board of Directors that results from an increase in the number of directors and any other vacancy occurring in the Board of Directors shall be filled by a majority of the directors then in office, even if less than a quorum, or by a sole remaining director. Any director elected to fill a vacancy not resulting from an increase in the number of directors shall have the same remaining term as that of his or her predecessor.

2. Any director, or the entire Board of Directors, may be removed from office only for cause and only by the affirmative vote of not less than a majority of the votes entitled to be cast by the holders of all the then outstanding shares of Voting Stock (as defined in Article VII, Section C), voting together as one class; provided, however, that if a proposal to remove a director is made by or on behalf of an Interested Person (as defined in Article VII, Section C) or a director who is not an Independent Director (as defined in Article VII, Section C), then such removal shall require the affirmative vote of not less than a majority of the votes entitled to be cast by the holders of all the then outstanding shares of Voting Stock, voting together as one class, excluding Voting Stock beneficially owned by such Interested Person.

3. Notwithstanding the foregoing, whenever the holders of any one or more classes or series of stock issued by the Corporation shall have the right, voting separately by class or series, to elect directors, the election, term of office, filling of vacancies and other features of such directorships shall be governed by the terms of this Restated Certificate of Incorporation applicable thereto, as amended, and such directors so elected shall not be divided into classes pursuant to this Article V, Section A unless expressly provided by such terms.

B. Additional Authority of Board. In furtherance and not in limitation of the powers conferred by statute, the Board of Directors is expressly authorized:

1. To make, alter, amend or repeal the By-laws of the Corporation. The holders of shares of Voting Stock shall, to the extent such power is at the time conferred on them by applicable law, also have the power to make, alter, amend or repeal the By-laws of the Corporation, provided that any proposal by or on behalf of an Interested Person or a director who is not an Independent Director to make, alter, amend or repeal the By-laws shall require approval by the affirmative vote described in Article VII, Section A, unless either (a) such action has been approved by a majority of the Board of Directors prior to such Interested Person first becoming an Interested Person or (b) prior to such Interested Person first becoming an Interested Person, a majority of the Board of Directors has approved such Interested Person becoming an Interested Person and, subsequently, a majority of the Independent Directors has approved such action.

2. To authorize and cause to be executed mortgages and liens upon the real and personal property of the Corporation.

3. To set apart out of any of the funds of the Corporation available for dividends a reserve or reserves for any proper purpose and to abolish any such reserve in the manner in which it was created.

4. By a majority of the whole Board of Directors, to designate one or more committees, each committee to consist of one or more of the directors of the Corporation. The Board of Directors may designate one or more directors as alternate members of any committee, who may replace any absent or disqualified member at any meeting of the committee. The By-laws may provide that in the absence or disqualification of a member of a committee, the member or members thereof present at any meeting and not disqualified from voting, whether or not he or they constitute a quorum, may unanimously appoint another member of the Board of Directors to act at the meeting in the place of any such absent disqualified member. Any such committee, to the extent provided in the resolution of the Board of Directors, or in the By-laws of the Corporation, shall have and may exercise all the powers and authority of the Board of Directors in the management of the business and affairs of the Corporation, and may authorize the seal of the Corporation to be affixed to all papers which may require it; but no such committee shall have the power or authority in reference to amending the Restated Certificate of Incorporation (except that a committee may, to the extent authorized in the resolution or resolutions providing for the issuance of shares of stock adopted by the Board of Directors as provided in Article IV hereof, fix the designations and any of the preferences or rights of such shares relating to dividends, redemption, dissolution, any distribution of assets of the Corporation or the conversion into, or the exchange of such shares for, shares of any other class or classes or any other series of the same or any other class or classes of stock of the Corporation or fix the number of shares of any series of stock or authorize the increase or decrease of the shares of any series), adopting an agreement of merger or consolidation, recommending to the stockholders the sale, lease or exchange of all or substantially all of the Corporation's property and assets, recommending to the stockholders a dissolution of the Corporation or a revocation of a

dissolution, or amending the By-laws of the Corporation; and, unless the resolution or By-laws expressly so provide, no such committee shall have the power or authority to declare a dividend, to authorize the issuance of stock or to adopt a certificate of ownership and merger pursuant to Section 253 of the General Corporation Law of the State of Delaware.

5. When and as authorized by the stockholders in accordance with statute, to sell, lease or exchange all or substantially all of the property and assets of the Corporation, including its goodwill and its corporate franchises, upon such terms and conditions and for such consideration, which may consist in whole or in part of money or property including shares of stock in, and/or other securities of, any other corporation or corporations, as the Board of Directors shall deem expedient and for the best interests of the Corporation.

C. In addition to any other considerations which the Board of Directors may lawfully take into account, in determining whether to take or to refrain from taking corporate action on any matter, including proposing any matter to the stockholders of the Corporation, the Board of Directors may take into account the long-term as well as the short-term interests of the Corporation and its stockholders (including the possibility that these interests may be best served by the continued independence of the Corporation), customers, employees and other constituencies of the Corporation and its subsidiaries, including the effect upon communities in which the Corporation and its subsidiaries do business. In so evaluating any such determination, the Board of Directors shall be deemed to be performing their duties and acting in good faith and in the best interests of the Corporation within the meaning of Section 145 of the General Corporation Law of the State of Delaware, or any successor provision.

D. Nomination and Election of Directors. Subject to the rights of holders of any class or series of stock having a preference over the Common Stock as to dividends or upon liquidation, dissolution or winding-up, nominations for the election of directors may be made by the Board of Directors or a committee or person appointed by the Board of Directors or by any stockholder entitled to vote in the election of directors generally. However, any stockholder entitled to vote in the election of directors generally may nominate one or more persons for election as directors at an annual meeting only

pursuant to the Corporation's notice of such meeting or if written notice of such stockholder's intent to make such nomination or nominations has been received by the Secretary of the Corporation not less than sixty nor more than ninety days prior to the first anniversary of the preceding year's annual meeting; provided, however, that in the event that the date of the annual meeting is advanced by more than thirty days or delayed by more than sixty days from such anniversary, notice by the stockholder to be timely must be so received not earlier than the ninetieth day prior to such annual meeting and not later than the close of business on the later of (1) the sixtieth day prior to such annual meeting or (2) the tenth day following the day on which notice of the date of the annual meeting was mailed or public disclosure thereof was made by the Corporation, whichever first occurs. For purposes of calculating the first such notice period following adoption of this Restated Certificate of Incorporation, the first anniversary of the 1992 annual meeting shall be deemed to be May 15 , 1993. Each such notice shall set forth: (a) the name and address of the stockholder who intends to make the nomination and of the person or persons to be nominated; (b) a representation that the stockholder is a holder of record of stock of the Corporation entitled to vote at such meeting and intends to appear in person or by proxy at the meeting to nominate the person or persons specified in the notice; (c) a description of all arrangements or understandings between the stockholder and each nominee and any other person or persons (naming such person or persons) relating to the nomination or nominations; (d) the class and number of shares of the Corporation which are beneficially owned by such stockholder and the person to be nominated as of the date of such stockholder's notice and by any other stockholders known by such stockholder to be supporting such nominees as of the date of such stockholder's notice; (e) such other information regarding each nominee proposed by such stockholder as would be required to be included in a proxy statement filed pursuant to the proxy rules of the Securities and Exchange Commission; and (f) the consent of each nominee to serve as a director of the Corporation if so elected.

In addition, in the event the Corporation calls a special meeting of stockholders for the purpose of electing one or more directors, any stockholder entitled to vote in the election of directors generally may nominate one or more persons for election as directors at a special meeting only pursuant to the Corporation's notice of meeting or if written notice of such stockholder's intent to make such nomination or nominations, setting forth the information and complying with the

form described in the immediately preceding paragraph, has been received by the Secretary of the Corporation not earlier than the ninetieth day prior to such special meeting and not later than the close of business on the later of (i) the sixtieth day prior to such special meeting or (ii) the tenth day following the day on which notice of the date of the special meeting was mailed or public disclosure thereof was made by the Corporation, whichever comes first.

No person shall be eligible for election as a director of the Corporation unless nominated in accordance with the procedures set forth in this Article V, Section D. The presiding officer of the meeting shall, if the facts warrant, determine and declare to the meeting that a nomination was not made in accordance with the procedures prescribed by this Article V, Section D, and if he or she should so determine, the defective nomination shall be disregarded.

Elections of directors need not be by written ballot unless the By-laws of the Corporation shall so provide.

ARTICLE VI

STOCKHOLDERS

A. Meetings of Stockholders; Books. Meetings of the stockholders may be held within or without the State of Delaware, as the By-laws may provide. Any action required or permitted to be taken by the stockholders of the Corporation must be effected at a duly called annual or special meeting of such stockholders and may not be effected by a consent in writing by any such holders. Subject to the rights of holders of any class or series of stock having a preference over the Common Stock as to dividends or upon liquidation, dissolution or winding-up, special meetings of the stockholders of the Corporation may be called only by the Board of Directors pursuant to a resolution approved by a majority of the entire Board of Directors. The books of the Corporation may be kept (subject to any provision contained in the statutes) outside the State of Delaware at such place or places as may be designated from time to time by the Board of Directors or in the By-laws of the Corporation.

Except as otherwise required by law or by this Restated Certificate of Incorporation, the holders of not less than a majority in voting power of the shares entitled to vote at any meeting of stockholders, present in person or by proxy,

shall constitute a quorum, and the act of the holders of a majority in voting power of the shares present in person or by proxy and entitled to vote on the subject matter shall be deemed the act of the stockholders. If a quorum shall fail to attend any meeting, the presiding officer may adjourn the meeting to another place, date or time. If a notice of any adjourned special meeting of stockholders is sent to all stockholders entitled to vote thereat, stating that it will be held with one-third (1/3) in voting power of the shares entitled to vote thereat constituting a quorum, then except as otherwise required by law, one-third (1/3) in voting power of the shares entitled to vote at such adjourned meeting, present in person or by proxy, shall constitute a quorum, and, except as otherwise required by law or this Restated Certificate of Incorporation, all matters shall be determined by the holders of a majority in voting power of the shares present in person or by proxy and entitled to vote on the subject matter.

B. Proposals of Stockholders. At any meeting of the stockholders, only such business shall be conducted as shall have been properly brought before such meeting. To be properly brought before an annual meeting, business must be (1) specified in the notice of meeting (or any supplement thereto) given by or at the direction of the Board of Directors, (2) otherwise properly brought before the meeting by or at the direction of the Board of Directors or (3) otherwise properly brought before the meeting by a stockholder. For business to be properly brought before an annual meeting by a stockholder, the stockholder must have given timely notice thereof in writing to the Secretary of the Corporation. To be timely, a stockholder's notice must be received not less than sixty days nor more than ninety days prior to the first anniversary of the preceding year's annual meeting; provided, however, that in the event that the date of the annual meeting is advanced by more than thirty days or delayed by more than sixty days from such anniversary, notice by the stockholder to be timely must be so received not earlier than the ninetieth day prior to such annual meeting and not later than the close of business on the later of (1) the sixtieth day prior to such annual meeting or (2) the tenth day following the date on which notice of the date of the annual meeting was mailed or public disclosure thereof was made, whichever first occurs. For purposes of calculating the first such notice period following adoption of this Restated Certificate of Incorporation, the first anniversary of the 1992 annual meeting shall be deemed to be May 15 1993. Each such notice shall set forth as to each matter the stockholder proposes to bring before the annual

meeting: (a) a brief description of the business desired to be brought before the annual meeting and the reasons for conducting such business at the meeting, (b) the name and address, as they appear on the Corporation's books, of the stockholder proposing such business, (c) the class, series and number of shares of the Corporation which are beneficially owned by the stockholder and (d) any material interest of the stockholder in such business. To be properly brought before a special meeting, business must be (i) specified in the notice of meeting (or any supplement thereto) given by or at the direction of the Board of Directors or (ii) otherwise properly brought before the meeting by or at the direction of the Board of Directors.

No business shall be conducted at any meeting of the stockholders except in accordance with the procedures set forth in this Article VI, Section B. The presiding officer of the meeting shall, if the facts warrant, determine and declare to the meeting that business was not properly brought before the meeting and in accordance with the provisions of this Article VI, Section B, and if he or she should so determine, any such business not properly brought before the meeting shall not be transacted. Nothing herein shall be deemed to affect any rights of stockholders to request inclusion of proposals in the Corporation's proxy statement pursuant to Rule 14a-8 under the Securities Exchange Act of 1934, as amended (the "Exchange Act").

ARTICLE VII

BUSINESS TRANSACTIONS

A. In addition to any affirmative vote required by law or this Restated Certificate of Incorporation or the By-laws of the Corporation, and except as otherwise expressly provided in Section B of this Article VII, a Business Transaction (as hereinafter defined) with, or proposed by or on behalf of, any Interested Person (as hereinafter defined) or any Affiliate (as hereinafter defined) of any Interested Person or any person who thereafter would be an Affiliate of such Interested Person shall require approval by the affirmative vote of not less than two-thirds (2/3) of the votes entitled to be cast by holders of all the then outstanding Voting Stock, voting together as one class, excluding Voting Stock beneficially owned by such Interested Person. Such affirmative vote shall be required notwithstanding the fact that no vote may be required, or that a lesser percentage may be specified, by law or in any agreement with any national securities exchange or otherwise.

B. The provisions of Section A of this Article VII shall not be applicable to any particular Business Transaction, and such Business Transaction shall require only such affirmative vote, if any, as is required by law or by any other provision of this Restated Certificate of Incorporation or the By-laws of the Corporation, or any agreement with any national securities exchange, if either (1) the Business Transaction shall have been approved by a majority of the Board of Directors prior to such Interested Person first becoming an Interested Person or (2) prior to such Interested Person first becoming an Interested Person, a majority of the Board of Directors shall have approved such Interested Person becoming an Interested Person and, subsequently, a majority of the Independent Directors (as hereinafter defined) shall have approved the Business Transaction.

C. The following definitions shall apply with respect to this Article VII:

1. The term "Affiliate" shall mean a person that directly, or indirectly through one or more intermediaries, controls, or is controlled by, or is under common control with, a specified person.

2. A person shall be a "beneficial owner" of any Capital Stock (a) which such person or any of its Affiliates beneficially owns, directly or indirectly; (b) which such person or any of its Affiliates has, directly or indirectly, (i) the right to acquire (whether such right is exercisable immediately or subject only to the passage of time or the occurrence of one or more events), pursuant to any agreement, arrangement or understanding or upon the exercise of conversion rights, exchange rights, warrants or options, or otherwise, or (ii) the right to vote pursuant to any agreement, arrangement or understanding; provided, however, that a person shall not be deemed the beneficial owner of any security if the agreement, arrangement or understanding to vote such security arises solely from a revocable proxy or consent solicitation made pursuant to and in accordance with the Exchange Act, and is not also then reportable on Schedule 13D under the Exchange Act (or a comparable or successor report); or (c) which is beneficially owned, directly or indirectly, by any other person with which such person or any of its Affiliates has any agreement, arrangement or understanding for the purpose of acquiring, holding, voting or disposing of any shares of Capital Stock (except to the extent permitted by the proviso of clause (b)(ii) above). For the purposes of determining whether a

person is an Interested Person pursuant to paragraph (6) of this Section C, the number of shares of Capital Stock deemed to be outstanding shall include shares deemed beneficially owned by such person through application of this paragraph (2) of Section C, but shall not include any other shares of Capital Stock that may be issuable pursuant to any agreement, arrangement or understanding, or upon exercise of conversion rights, warrants or options, or otherwise.

3. The term "Business Transaction" shall mean any of the following transactions when entered into by the Corporation or a subsidiary of the Corporation with, or upon a proposal by or on behalf of, any Interested Person or any Affiliate of any Interested Person:

(a) any merger or consolidation of the Corporation or any subsidiary with (i) any Interested Person, or (ii) any other corporation which is, or after such merger or consolidation would be, an Affiliate of an Interested Person;

(b) any sale, lease, exchange, mortgage, pledge, transfer or other disposition (in one transaction or a series of transactions), except proportionately as a stockholder of the Corporation, to or with the Interested Person of assets of the Corporation (other than Capital Stock (as hereinafter defined)) or of any subsidiary of the Corporation which assets have an aggregate market value equal to ten percent (10%) or more of the aggregate market value of all the outstanding stock of the Corporation;

(c) any transaction that results in the issuance of shares or the transfer of treasury shares by the Corporation or by any subsidiary of the Corporation of any Capital Stock or any capital stock of such subsidiary to the Interested Person, except (i) pursuant to the exercise, exchange or conversion of securities exercisable for, exchangeable for or convertible into stock of the Corporation or any such subsidiary which securities were outstanding prior to the time that the Interested Person became such, (ii) pursuant to a dividend or distribution paid or made, or the exercise, exchange or conversion of securities exercisable for, exchangeable for or convertible into stock of the Corporation or any such subsidiary which security is distributed, pro rata to all holders of a class or series of stock of the Corporation subsequent

to the time the Interested Person became such, (iii) pursuant to an exchange offer by the Corporation to purchase stock made on the same terms to all holders of said stock, (iv) any issuance of shares or transfer of treasury shares of Capital Stock by the Corporation, provided, however, that in the case of each of clauses (ii) through (iv) above there shall be no increase of more than one percent (1%) in the Interested Person's proportionate share of the Capital Stock of any class or series or of the Voting Stock or (v) pursuant to a public offering or private placement by the Corporation to an Institutional Investor;

(d) any reclassification of securities, recapitalization or other transaction involving the Corporation or any subsidiary of the Corporation which has the effect, directly or indirectly, of (i) increasing the proportionate share of the stock of any class or series, or securities convertible into the stock of any class or series, of the Corporation or of any such subsidiary which is owned by the Interested Person, except as a result of immaterial changes due to fractional share adjustments or as a result of any purchase or redemption of any shares of stock not caused, directly or indirectly, by the Interested Person or (ii) increasing the voting power, whether or not then exercisable, of an Interested Person in any class or series of stock of the Corporation or any subsidiary of the Corporation;

(e) the adoption of any plan or proposal by or on behalf of an Interested Person for the liquidation or dissolution of the Corporation; or

(f) any receipt by the Interested Person of the benefit, directly or indirectly (except proportionately as a stockholder of the Corporation), of any loans, advances, guarantees, pledges, tax benefits or other financial benefits (other than those expressly permitted in subparagraphs (a) through (e) above) provided by or through the Corporation or any subsidiary.

4. The term "Capital Stock" shall mean all capital stock of the Corporation authorized to be issued from time to time under Article IV of this Restated Certificate of Incorporation.

5. The term "Independent Directors" shall mean the members of the Board of Directors who are not Affiliates or

representatives of, or associated with, an Interested Person and who were either directors of the Corporation prior to any person becoming an Interested Person or were recommended for election or elected to succeed such directors by a vote which includes the affirmative vote of a majority of the Independent Directors.

6. The term "Institutional Investor" shall mean a person that (a) has accquired, or will acquire, all of its securities of the Corporation in the ordinary course of its business and not with the purpose nor with the effect of changing or influencing the control of the Corporation, nor in connection with or as a participant in any transaction having such purpose or effect, including any transaction subject to Rule 13d-3(b) under the Exchange Act, and (b) is a registered broker dealer; a bank as defined in Section 3(a)(6) of the Exchange Act; an insurance company as defined in, or an investment company registered under, the Investment Company Act of 1940; an investment advisor registered under the Investment Advisors Act of 1940; an employee benefit plan or pension fund subject to the Employee Retirement Income Security Act of 1974 or an endowment fund; a parent holding company, provided that the aggregate amount held directly by the parent and directly and indirectly by its subsidiaries which are not persons specified in the foregoing subclauses of this clause (b) does not exceed one percent (1%) of the securities of the subject class; or a group, provided that all the members are persons specified in the foregoing subclauses of this clause (b).

7. The term "Interested Person" shall mean any person (other than the Corporation, any subsidiary, any profit-sharing, employee stock ownership or other employee benefit plan of the Corporation or any subsidiary or any trustee of or fiduciary with respect to any such plan when acting in such capacity) who (a) is the beneficial owner of Voting Stock representing ten percent (10%) or more of the votes entitled to be cast by the holders of all then outstanding shares of Voting Stock; (b) has stated in a filing with any governmental agency or press release or otherwise publicly disclosed a plan or intention to become or consider becoming the beneficial owner of Voting Stock representing ten percent (10%) or more of the votes entitled to be cast by the holders of all then outstanding shares of Voting Stock and has not expressly abandoned such plan, intention or consideration more than two years prior to the date in question; or (c) is an Affiliate of the Corporation and at any time within the two-year period immediately prior to the date in question was the beneficial owner of Voting Stock

representing ten percent (10%) or more of the votes entitled to be cast by holders of all then outstanding shares of Voting Stock.

8. The term "person" shall mean any individual, corporation, partnership, unincorporated association, trust or other entity.

9. The term "subsidiary" means any company of which a majority of the voting securities are owned, directly or indirectly, by the Corporation.

10. The term "Voting Stock" shall mean Capital Stock of any class or series entitled to vote in the election of directors generally.

D. A majority of the Independent Directors shall have the power and duty to determine, on the basis of information known to them after reasonable inquiry, for the purposes of (1) this Article VII, all questions arising under this Article VII including, without limitation (a) whether a person is an Interested Person, (b) the number of shares of Capital Stock or other securities beneficially owned by any person; and (c) whether a person is an Affiliate of another; and (2) this Restated Certificate of Incorporation, the question of whether a person is an Interested Person. Any such determination made in good faith shall be binding and conclusive on all parties.

E. Nothing contained in this Article VII shall be construed to relieve any Interested Person from any fiduciary obligation imposed by law.

ARTICLE VIII

LIMITED LIABILITY; INDEMNIFICATION

A. Limited Liability. No person shall be personally liable to the Corporation or its stockholders for monetary damages for breach of fiduciary duty as a director, provided, however, that the foregoing shall not eliminate or limit the liability of a director (1) for any breach of the director's duty of loyalty to the Corporation or its stockholders, (2) for acts or omissions not in good faith or which involve intentional misconduct or a knowing violation of law, (3) under Section 174 of the General Corporation Law of the State of Delaware or (4) for any transaction from which the director derived an improper personal benefit. If the General

Corporation Law of the State of Delaware is amended hereafter to authorize corporate action further eliminating or limiting the personal liability of directors, then the liability of a director of the Corporation shall be eliminated or limited to the fullest extent permitted by the General Corporation Law of the State of Delaware, as so amended. Any amendment, repeal or modification of this Article VIII, Section A shall not adversely affect any right or protection of a director of the Corporation existing hereunder with respect to any act or omission occurring prior to such amendment, repeal or modification.

B. Indemnification. Each person who is or was a director or officer of the Corporation, and each such person who is or was serving at the request of the Corporation as a director or officer of another corporation, or of a partnership, joint venture, trust or other enterprise, including service with respect to employee benefit plans maintained or sponsored by the Corporation (including the heirs, executors, administrators and estate of such person) shall be indemnified and advanced expenses by the Corporation to the fullest extent permitted from time to time by the General Corporation Law of the State of Delaware or any other applicable laws as presently or hereafter in effect. The Corporation may, to the extent authorized in the By-laws of the Corporation or from time to time by the Board of Directors, grant rights to indemnification and to the advancement of expenses to any employee or agent of the Corporation to the fullest extent of the provisions of this Article with respect to the indemnification and advancement of expenses of directors and officers of the Corporation. Without limiting the generality or the effect of the foregoing, the Corporation may enter into one or more agreements with any person which provide for indemnification greater or different than that provided in this Article VIII, Section B. Any amendment, repeal or modification of this Article VIII, Section B shall not adversely affect any right or protection existing hereunder or pursuant hereto immediately prior to such amendment, repeal or modification.

ARTICLE IX

AMENDMENTS

The Corporation reserves the right to amend, alter, change or repeal any provision contained in this Restated Certificate of Incorporation, in the manner now or hereafter prescribed by statute, and all rights conferred upon stockholders herein are granted subject to this reservation; provided,

however, that notwithstanding any other provisions of this Restated Certificate of Incorporation or the By-laws of the Corporation (and notwithstanding the fact that a lesser percentage or separate class vote may be specified by law, this Restated Certificate of Incorporation or the By-laws of the Corporation), any proposal by or on behalf of an Interested Person or a director who is not an Independent Director to amend, alter, change or repeal any provision of paragraph 2 of Section A of Article V, Article VII, or Article VIII or to adopt any provision inconsistent with any of such provisions, shall require approval by the affirmative vote described in Section A of Article VII unless either (1) such action has been approved by a majority of the Board of Directors prior to such Interested Person first becoming an Interested Person or (2) prior to such Interested Person first becoming an Interested Person, a majority of the Board of Directors has approved such Interested Person becoming an Interested Person and, subsequently, a majority of the Independent Directors has approved such action.

IN WITNESS WHEREOF Union Carbide Industrial Gases Inc. has caused this Restated Certificate of Incorporation to be duly executed in its corporate name this 5th day of June, 1992.

Union Carbide Industrial Gases Inc.

By: David H. Chafey
Vice President

(CORPORATE SEAL)

Assistant Secretary